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MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: TRUE BLUE PA#: 01-138

Date: August 1, 1994 Time: 0945-1345

Field Team Leader: Bisch, Pioneer

Sampling Personnel: Flammang, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; warm (70°-80°);
slight breeze from west.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #8: Mill building
viewed from above; #9: TP-1; #10: Mill building viewed from TP-1;
#11: Intact mill stamps; #12: Mill building from below; #14: WR-1.
Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms):
Many cabins and scattered debris located near millsite. The area
is identified in literature as "Lion City." Mill building is in
state of collapse, but all 20 stamps are intact. A tailings
impoundment approximately 2 acres in size located during the 1993
Lower Cleve site investigation was not characterized during this
investigation. This impoundment was located between the Lower
Cleve and the True Blue mill on the south side of the drainage
approximately 100 feet above the stream.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives:
Regrade/contour tailings and waste rock dumps; apply coversoil over
tailings and revegetate tailings and dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): TRUE BLUE PA#: 01-138

Legal Description: T 3S ; R 11W ; Sec. 2 , SW 1/4 NE 1/4 1/4

County: BEAVERHEAD Mining District: HECLA/VIPOND PARK

Latitude: N 45° 36' 18" Longitude: W 112° 55' 42"

Primary Drainage Basin and Code: Trapper Creek/10020004

Secondary Drainage Basin: Spring Creek

USGS Quadrangle map name(s): Mount Tahepia

Mine Type/Commodities: Millsite/Silver, Lead, Gold

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district: East approx. 1/4 mile of the Hecla mines and approx. 1/4 mile west of the Franklin mine. Mill is approximately 1/2 mile west of the Lower Cleve (01-143).

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 8300' , Slope 5° ,
Aspect East

Land use: Mining X , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 2 acre(s) .

Site Dimensions: 250 feet x 350 feet

Predominant vegetation types: Lodgepole pine, spruce, bunch grasses, thistle

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites).
Located in drainage between Hecla and Franklin mines.

Well logs within 1 mile radius; (Attach MRMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The mining district occupies a glacial amphitheater drained by Trapper and Sappington Creeks. Site lies on west side of creek identified as Spring Creek in literature. Spring Creek flows east away from the site to confluence with Sappington Creek 1 mile below the site. Sappington Creek then flows into Trapper Creek 1/3 mile east of that. Trapper Creek flows into the Big Hole River approx. 15 miles east. The ore deposits in the district are localized in a dolomitized carbonate strata of Paleozoic Age, which have been folded into a subelliptical dome. Area is also underlain by quartz monzonite of Mount Torrey Batholith.

Mining/milling history, ore type/tenor, host rock, gangue: Ore was discovered in the district in 1872. Sometime between 1913 and 1915, a 20-stamp concentrator was built by the Penobscot Mining Company. Literature reports that ore, slag, and mill tailings were shipped off-site through at least 1945. Ores mined in the district were found mostly in limestone and were oxidized. Ore minerals were silver bearing cerrussite, iron and manganese oxides stained by copper oxides in gangue of quartz. Some pyrite, sphalerite and massive galena were also associated with the ore.

Mine Operation?

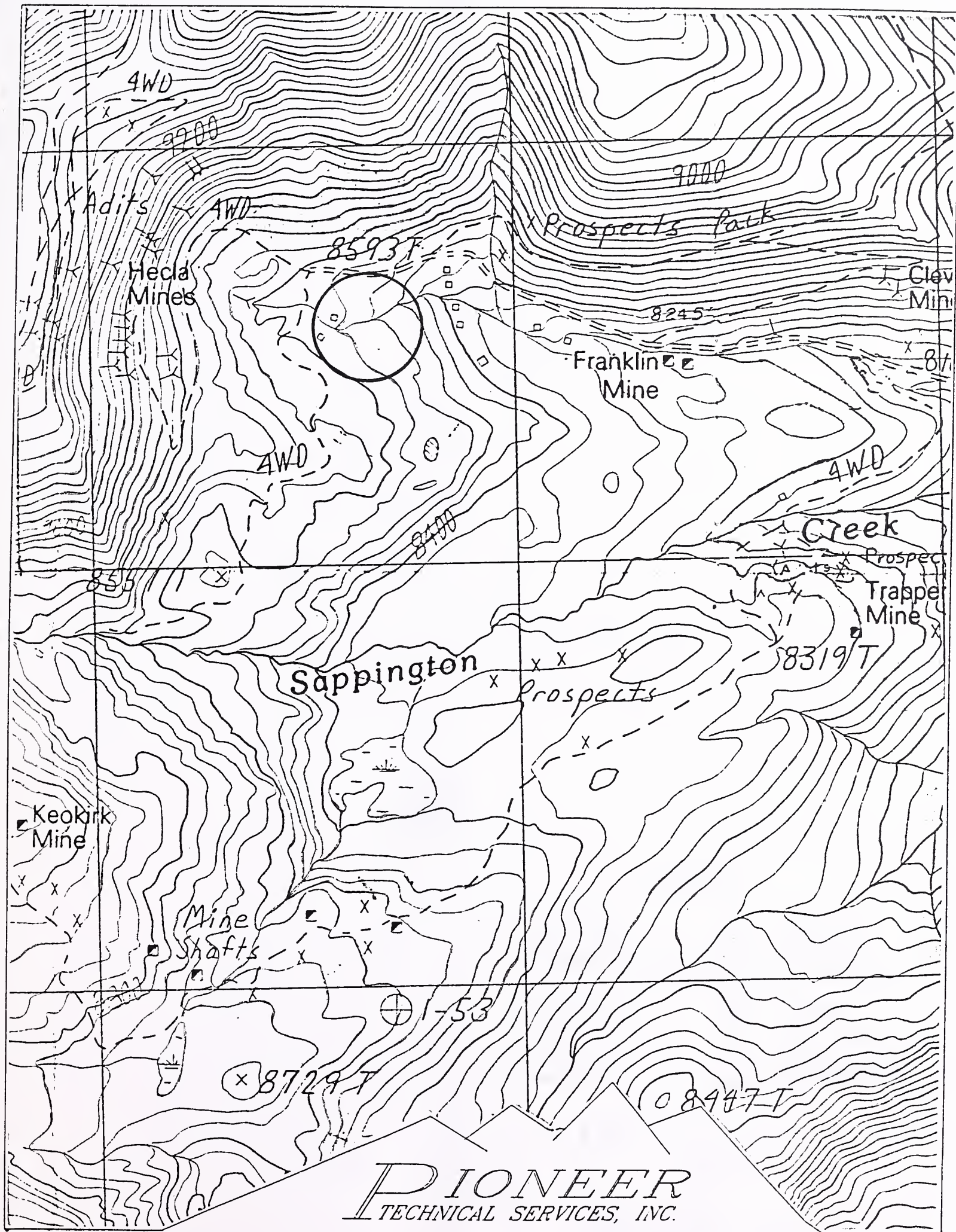
Shafts - Yes___, No X, # ____, Comment_____
Adits - Yes___, No X, # ____, Comment_____
Pits - Yes___, No X, # ____, Comment_____
Placers - Yes___, No X, # ____, Comment_____
Other - Yes___, No X, # ____, Comment_____

Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: 1913 to possibly 1945

Origin of Ore Milled - Custom Mill X Dedicated Mill___; Number and names of mines that supplied mill feed: Hecla mines, Lion Mountain, Atlantus, True Fissure, Trapper, Cleve and Franklin lodes

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Reported in literature as 20-stamp concentrator; all 20 stamps still present during this investigation.



TRUE BLUE, P.A. NO. 01-138

T03S, P11W, SECTION 02

SCALE: 1" = 1000'

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Very coarse (cobbles/boulders) main tailings pile (sand to > 4") with shallow layer of underlying fine material.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Tailings too coarse for augering; average depth is approximately 15 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): None present. Note: Tailings impoundment approximately 1/4 mile southeast of the mill was not located or investigated during this site investigation.

Comments on potential for mitigation: Contour tailings pile to reduce slopes, apply coversoil, and revegetate.

SOURCE INVENTORY FORM

SAMPLERS: West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (YD ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)*	RADIO-ACTIVITY (MR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
TP-1A	TAIL	5,860	South side of pile; brown silt	None	6.8 (D)	0.04	01-138-TP-1	08/01/94 1100	T-Metals, ABA
TP-1B	TAIL		North side of pile; black, silty clay (may be underlying soil)	None	6.5 (D)	0.03	N/A	N/A	XRF Analysis
TP-1C	TAIL	5*	Shallow layer of fines on north end; brown silty clay	None	6.2 (D)	0.04	01-138-TP-2	08/01/94 1130	T-Metals, ABA
TP-2	UNK		Sample in two excavated pits on southeast part of site; 9-12" bgs, possibly tailings, ash, or old streambed	None	6.7 (D)	0.035	N/A	N/A	XRF Analysis
WR-1	WR	800	Small pile, mostly vegetated, northeast of mill on top of east end	None	6.8 (D)	0.03	N/A	N/A	XRF Analysis
WR-2	OTH	550	Pile west of mill building; appears to be dirt from mill excavation	None	NM	NM	N/A	N/A	N/A
SS-1	SOIL	N/A	Background soil south of site above mill building	N/A	N/A	N/A	01-138-SS-1	08/01/94 1230	T-Metals

*Direct reading (Kilovolt Meter); S-saturated Paste (Orion Meter)

Comments or deviations from SOPs: 01-138-TP-1 is grab sample of TP-1A. 01-138-TP-2 is grab sample of TP-1C. *TP-1C volume is a rough estimate based on surface expression. TP-2 was taken from a layer of possible tailings or concentrate present 8 to 12 inches below ground surface in several small pits corresponding with the TP-1C XRF sample. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:_____

Filled shafts: Yes___, No X, Number:___ Identification:_____

Seeps/Springs: Yes X, No___, Number: 6 Identification: Spring at foot of mill and just west of mill; 3 springs are source for Spring Creek; 1 spring starts at base of cabin upstream of downgradient Spring Creek sample; 1 spring below WR-1.

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 1

Distance to nearest well used for drinking:

___<1,000 ft; ___1,000 ft to 0.5 miles; X>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible X, Unlikely___.

Shallow groundwater and uncontained source (TP-1) with elevated metal values.

Approximate Depth to Groundwater: X<25 ft; ___ 25 - 100 ft; ___ >100 ft.

Other observations/notes: N/A

SAMPLERS: Flammanq

[illegible]

FLOW: Estimated (E) or Measured (M) from edit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes ☒, No ☐, Name(s): Unnamed tributary to Sappington Creek (identified as Spring Creek in some of the literature)

Dry streambeds: Yes ☒, No ☐, Name(s): Dry drainage runs parallel to unnamed tributary and eventually merges with it below the mill.

Other surface water: Yes ☐, No ☒, Name(s)/Description: _____

Waste materials within any floodplain: Yes ☐, No ☒ Source ID(s): _____

Approximate Flood frequency? ☐ 1 yr, ☐ 10 yr, ☐ 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)? 20 feet from base of WR-1 to spring west of mill; 15 feet from TP-1C base to spring at base of mill; 340 feet from TP-1A to Spring Creek.

Surface water draining onto or through waste sources: Yes ☐, No ☒, Describe: _____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Agriculture, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes ☐, No ☒. Distance downstream (ft)? 0-500 ☐; 500-1,000 ☐; >1,000 ☐. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Elevated metals in sediments at 750 feet downstream of site; no obvious erosional, etc., problems.

SAMPLERS: Bisch, Flammand

NOTES: Estimated (E) patterned to (M) patterned 20 (E) patterned (M)

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Did not collect sediment sample 1,000 feet downstream due to streamside disturbance approximately 800 feet downstream from the site.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO ₃)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH \leq 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres in drainage below mill

Wetlands present: Yes ☐, No ☒, Describe: Stream is boggy in places.

Carbonate rocks/soils: Yes ☒, No ☐, Describe: Abundant limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ☒; 10-30 ☐; 30-100 ☐; 100-300 ☐; 300-1,000 ☐; 1,000-3,000 ☐; 3,000-10,000 ☐; 10,000 or greater ☐; Comments _____

Nearest residence: ☐ <1,000 ft; ☐ 1,000 ft - 0.5 miles; ☒ >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: West

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LINE)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1A	None	Dry	10,550	10,550	No	Low
TP-1C	None	Dry	50	0	Yes	Low/Moderate
TP-2	None	Dry	ND	ND	Yes	None
WR-1	None	Dry	4,300	2,150	No	Low
WR-2	None	Dry	3,010	1,205	No	Low

Notes and Clarifications: TP-1C represents shallow layer of fine clay material located below TP-1 near mill. ND = Not Determined

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X (
Describe:_____

Population within 1 mile: 1-10____; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments None

Evidence of recreational use on site: Yes X, No____, Describe: Litter;
campfire rings.

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____Moderately Accessible - barbed wire fences,
road gated, or signs posted;____Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment____
Wilderness Area - Yes____, No X, Comment____
T&E Species Habitat - Yes____, No X, Comment____
Bat Habitat - Yes____, No X, Comment____

Primary Drainage____; Secondary Drainage X; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium X, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:____

Hazardous structures: Yes X, No____, Number 12, types and locations:____
Numerous cabins located near mill, most are collapsing; mill is
collapsing badly.

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Mines and Mineral Deposits (Except Fuels), Beaverhead County, Montana, Bulletin 85, Written by R.D. Geach, April 1972.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for True Blue, Prepared by Northern Engineering and Testing, June 17, 1987.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Mount Tahepia, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

**TRUE BLUE
PA NO. 01-138**

True Blue PA# 01-138
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BISCH
INVESTIGATION DATE: 08/01/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
01-138-SE1	4.2	54.1 J	21.8	3.8 J	3.6	5.1 J	125	19200 JX	0.60 JX	268 J	9.3	548	22.1 J	537	NR
01-138-SE2	1.2	17.7 J	44.4	1.1 UJ	8.5	8.0 J	47.6	23700 JX	0.43 JX	342 J	13.1	243	14.3 UJ	232	NR
01-138-TP1	81.4	142 J	6.9	37.9 J	2.5	1.3 UJ	767	3620 JX	2.96 JX	724 J	3.2	7780	114 J	12800	NR
01-138-TP2	85.7	3030 J	37.0	293 J	4.6	14.8 J	8970	32800 JX	90.4 JX	2520 J	14.7	38400	1420 J	34000	NR
BACKGROUND	2.1	45.0 J	223 J	2.2 J	10.1	16.2 J	45.7	19600 JX	0.34 JX	1190 J	14.2	275	13.0 UJ	322	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL Sulfur %	TOTAL Sulfur		Sulfur		Sulfate		Pyritic		Organic		Pyritic		Sulfur		Sulfur	
		ACID BASE	NEUTRAL	POTENT.	POTENT.	Sulfur	%	Sulfur	%	Sulfur	%	Sulfur	%	ACID BASE	ACID BASE	POTENT.	POTENT.
		1/1000t	1/1000t	1/1000t	1/1000t									1/1000t	1/1000t	1/1000t	1/1000t
01-138-TP1	<0.01	0.00	200	200	200	<0.01	<0.01	<0.01	<0.01	0.03	0.00	0.00	0.00	0.00	0.00	200	200
01-138-TP2	0.08	2.50	172	169	169	0.07	<0.01	<0.01	<0.01	0.02	0.00	0.00	0.00	0.00	0.00	172	172

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
01-138-SW1	0.12	1.9	23.6	4.0 U	8.4 U	6.8 U	5.9 U	37.4	0.13	2.3 U	14.4 U	4.5 J	51.6 U	15.6 U	158
01-138-SW2	0.12 U	2.1	23.3	4.0 U	8.4 U	6.8 U	5.9 U	98.9	0.12	6.4	14.4 U	6.3 J	51.6 U	15.6 U	162
01-138-SW3	1.02	11.8	10.5	4.0 U	8.4 U	9.0	35.2	222	0.25	24.0	14.4 U	252 J	51.6 U	247	109

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
01-138-SW1	103	<5.0	5.0	0.14	NR
01-138-SW2	134	<5.0	5.0	0.17	NR
01-138-SW3	56	<5.0	<5.0	<0.05	NR

LEGEND

SE1 - Downgradient of TP1; pbs is 340' west and 100' north.
SE2 - Upgradient of mill, just below where three spring flows merge together.
TP1 - Grab sample of the TP1A sub-sample.
TP2 - Grab sample of the TP1C sub-sample.
BACKGROUND - From the True Blue Mine (01-138-SS1).

SW1 - Same as sample 01-138-SE1.
SW2 - Same as sample 01-138-SE2.
SW3 - Spring approx. 10' southeast of southeast mill building corner.

XRF ANALYSIS RESULTS

**TRUE BLUE
PA NO. 01-138**

Mine Name: True Blue PA# 01-138
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHl	K	Ca	Tl	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
01-138-SE500		5730.91	88751.3	810.315			9871.14				647.808		99.2076
01-138-SE750		6926.89	112518	1051.93			10369.5			114.951 *	502.869		104.552
01-138-SE750-DUP		6458.64	112925	1166.42			10378.2			157.344 *	510.021		109.481
01-138-TP1A		3612.54	175784	348.347 *		879.81 *	4590.67			530.653	5686.32		84.0875
01-138-TP1B		6473.06	37106.9	2683		3997	52417.4	565.919 *		100.545	791.776		54.3424
01-138-TP1C		4833.09	76258.1	534.372 *		2337.55 *	28881.5			6567.3	25568.2		95.0841
01-138-TP2	842.661 *	7570.44	181997	1193.7			9593.33			337.527 *	1775.33		111.224
01-138-WR1		25460.1	37659	2857.52		3794.2	66247.5				662.077		152.805

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
01-138-SE500	67.1797			421.813	20.8197 *							
01-138-SE750	73.4894			356.94	21.2752 *							
01-138-SE750-DUP	64.1385			355.759	18.7136 *							
01-138-TP1A	21.238 *			1468.78				178.17 *	44.8361 *			
01-138-TP1B	231.459		7.46963 *	141.536 *								
01-138-TP1C	59.1737 *		15.2531 *	22227.6		437.723 *	168.593 *	3479.04	83.182 *	381.518 *	16.3886 *	15.8077 *
01-138-TP2	80.6064			866.381				118.143 *				
01-138-WR1	148.957			765.803	52.2508 *				196.231		16.5371 *	20.4953 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**TRUE BLUE
PA NO. 01-138**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

True Blue
01-138

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 23.393
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	1
8		NEAREST WELL	10
9		TARGETS SCORE	LINES 6 + 7 + 8 11.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 102929
SURFACE WATER PATHWAY			
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE	300
12		EXCEEDENCES	0
13A		CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 25.972
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	1
18		WETLANDS	10
19		FISHERY	5
20		RECREATION	0
21		IRRIGATION/STOCK	0
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 16
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 290886
AIR PATHWAY			
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE	0
26A		CONTAINMENT	10
26B		DISTANCE TO POPULATION	20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 200
27		LIKELIHOOD SCORE	LINES 25 + 26C 200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.908
29	AIR - TARGETS	POPULATION - 4 MILES	10
30		NEAREST RESIDENCE	10
31		WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 30
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 5448
DIRECT CONTACT PATHWAY			
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE	50
37A		ACCESSIBILITY	20
37B		DISTANCE TO POPULATION	20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 400
38		LIKELIHOOD SCORE	LINES 36 + 37C 450
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.818
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	0
41		NEAREST RESIDENCE	10
42		RECREATIONAL USE	10
43		TARGETS SCORE	SUM LINES 40 THRU 42 20
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 7362
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000		4.07

SITE NAME:
PA NUMBER:

True Blue
01-138

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	400
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	590
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 THRU 11	20
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	236.00



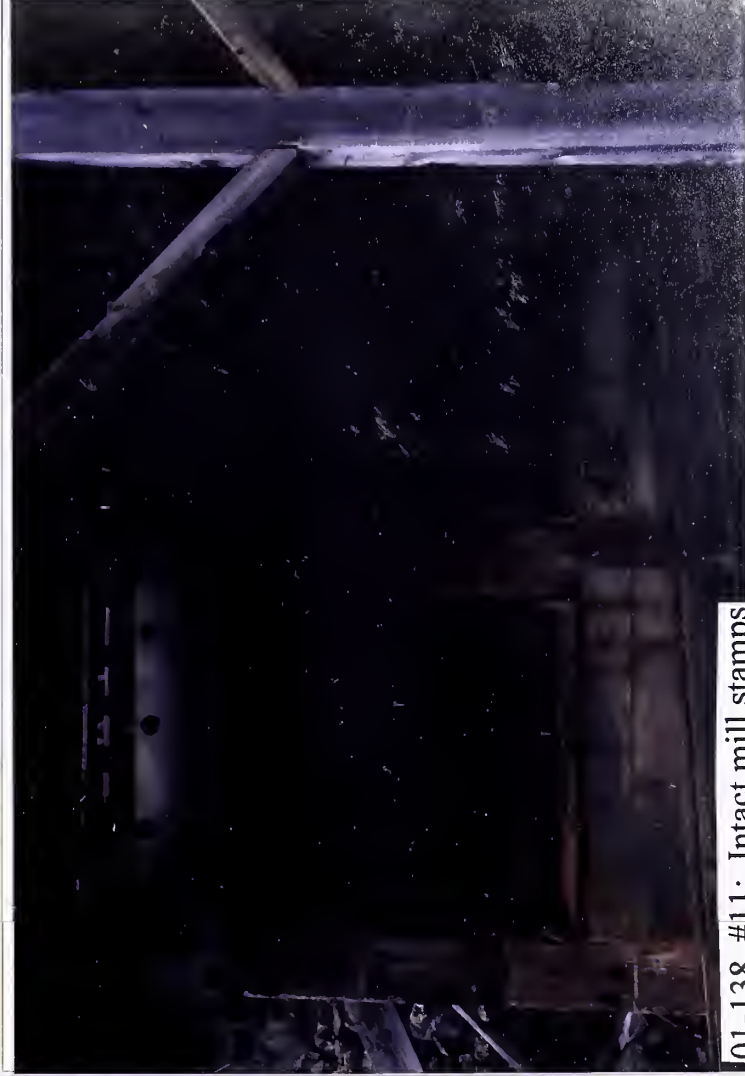
01-138, #8: Mill building from above



01-138, #9: TP-1



01-138, #10: Mill building from TP-1



01-138, #11: Intact mill stamps



01-138, #12: Mill building from below



01-138, #14: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: THORIUM CITY PA#: 01-500

Date: Not Investigated Time: N/A

Field Team Leader: N/A

Sampling Personnel: N/A

Visitors: N/A

Weather/Seasonality Observations: N/A

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): N/A

General Comments/Observations (not covered specifically in attached Inventory Forms): Part of this site was inventoried in 1993 as South Frying Pan Creek (01-211). Data collected by the BLM in a Preliminary Assessment (PA) was utilized for evaluation of the rest of this site. There are approximately 300 cubic yards of material over 65 acres (not including South Frying Pan Creek site). As part of the PA conducted by AEPCO, Inc. in 1986, the field investigation included environmental monitoring and a sampling network to monitor air quality, assess health and safety conditions, and collect representative waste/sediment/soil samples. The monitoring and sampling network consisted of: 1) 19 air monitoring stations (Stations 01-19); background station is 01; 2) One composite waste sampling station (Sample WS-A) from grab samples collected at five monitoring stations (Stations 02, 11, 13, 14, and 15); and 3) One composite surface water sample (Sample SW-A) collected from on-site surface water runoff downgradient from the trench and from a depressed area on-site (Monitoring Stations 16 and 17). The site sketch and Table 3-1 (In Appendix) provide quick reference to the locations of the monitoring and sampling stations.

Other Hazardous Materials/Substances Present: Radioactive wastes: Gross radiation 2-4 mRem/hr. According to the AEPCO, Inc. 1986 PA, about 700 cubic yards of radioactive spoil material was found on the entire site and is distributed as follows: 1) 300 cu. yds. on the steep northern bank of South Frying Pan Creek (01-211); 2) 100 cu. yds. at the entrance of the adit; 3) 200 cu. yds. in or near the trench; and 4) 100 cu. yds. in pits 1 through 8.

General Comments on Potential Remedial Alternatives: Any exposed radioactive waste rock should be covered for shielding purposes.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): THORIUM CITY PA#: 01-500

Legal Description: T 10S ; R 15W ; Sec. 28 , NW 1/4 NE 1/4 1/4
T 10S ; R 15W ; Sec. 28 , NE 1/4 NW 1/4 1/4

County: BEAVERHEAD Mining District: LEMHI

Latitude: N 45° 57' 05" Longitude: W 113° 27' 10"

Primary Drainage Basin and Code: Horse Prairie Creek/10020001

Secondary Drainage Basin: North Frying Pan Creek

USGS Quadrangle map name(s): Lemhi Pass

Mine Type/Commodities: Hardrock/Thorium

Activity Status: Active , Inactive/Exploration X , Abandoned .

Ownership: Known Y X N ; private/public? Public

Owner, Agent, or Contact (Include address and phone when available): BLM; Leased to Idaho Energy Resources Co.

Relationship to other mines/sites in the area/district: Last Chance No. 1 (01-216) and No. 2 (01-220) are 1/2 mile west of the site; South Frying Pan Creek (01-211) is within the boundary of this site area.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? In 1989, parts of the site were posted. Part of the site was fenced, but is now in disrepair.
CERCLIS No. MTD980953624.

General site features: Elevation 7650'-7900', Slope 5-30% ,
Aspect Southeast

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 5 acre(s) .
Site Dimensions: Scattered over 65 acres; disturbed - 1,000
feet x 200 feet

Predominant vegetation types: Grasses, sage

Access: roads - good (paved) , poor (maintained dirt road) X ,
4wd , trail .

Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Radioactivity associated with dumps on the site. Radiation exceeds 2 to 4 Rem/hr; thorium in dumps was 0.18 to 24 PC/g. Precambrian sedimentary rocks of the Belt Series are the basement rocks of the area; regionally metamorphosed and sericitized quartzite, interlayered with some green argillite. Site lies in outwash gravels. Site lies on South Frying Pan Creek, which travels east 2,000 feet to confluence with North Frying Pan Creek. Frying Pan Creek flows 2.5 miles to Trail Creek, which flows 10 miles to confluence with Horse Prairie Creek. Hydrogeologic data suggests that there are two aquifers in the area: a shallow alluvial one, as well as a deeper bedrock aquifer. Groundwater flows to the south from the site.

Mining/milling history, ore type/tenor, host rock, gangue: The mining operation occurred from 1949 to 1960. The ore has been developed only for thorium and rare-earth elements. Thorium bearing minerals identified in the area are of thorite, monzonite, and thoroquammite. Quartz is the principal gangue mineral.

Mine Operation?

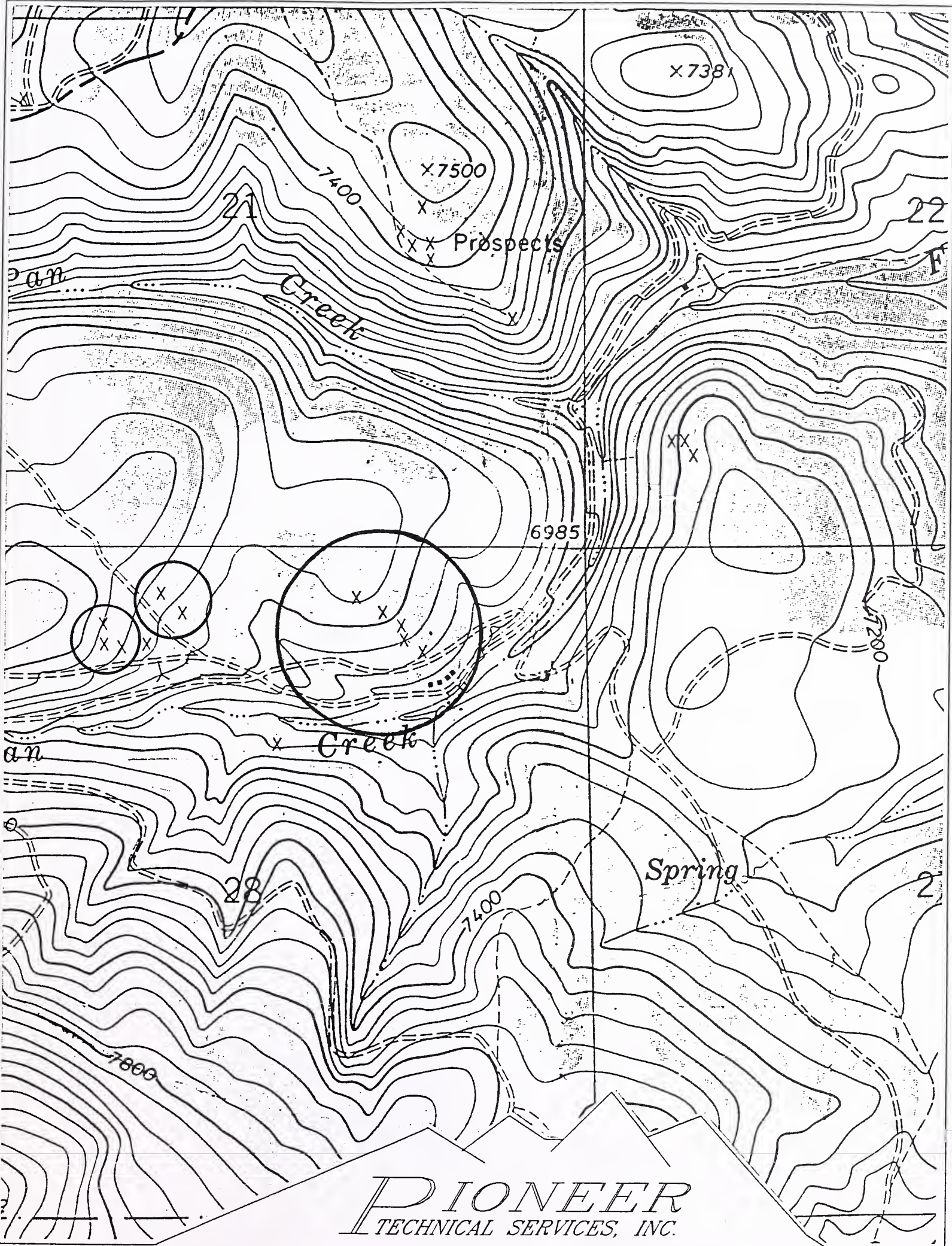
Shafts - Yes , No X, # , Comment
Adits - Yes X, No , # 1, Comment Collapsed
Pits - Yes X, No , # Many, Comment Exploration pits
Placers - Yes , No X, # , Comment
Other - Yes X, No , # 1, Comment Trench

Mill Operation? Yes , No X. If yes answer the next three questions:

Period(s) of Operation: N/A

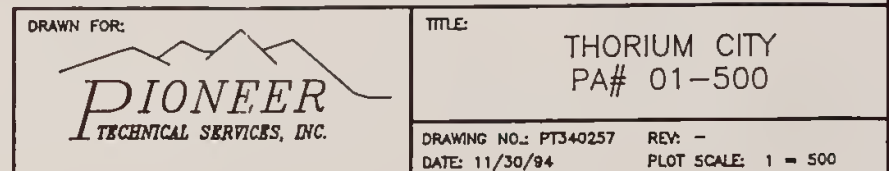
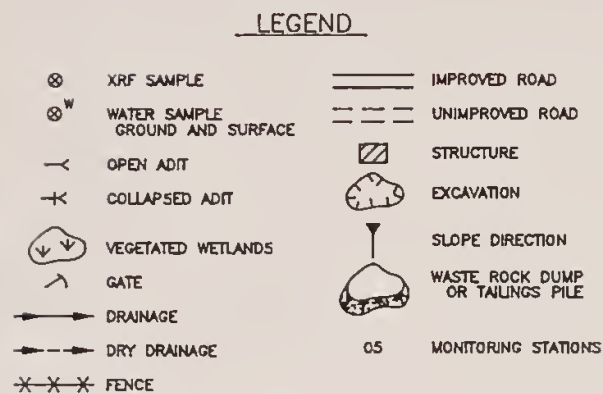
Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



PIONEER
TECHNICAL SERVICES, INC.

THORIUM CITY, P.A. NO. 01-500
T10S, R15W, SECTION 28
SCALE: 1" = 1000'



II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SAMPLERS:

[illegible]

D-Direct reading (Kelway Meter) ; S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs:

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:_____

Filled shafts: Yes___, No X, Number:___ Identification:_____

Seeps/Springs: Yes___, No X, Number:___ Identification:_____

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 1

Distance to nearest well used for drinking:

___<1,000 ft;___1,000 ft to 0.5 miles; X>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible X, Unlikely___.

Moderate groundwater depth; elevated radionuclides in waste rock.

Approximate Depth to Groundwater:___<25 ft; X 25 - 100 ft;___ >100 ft.

Other observations/notes: N/A

SAMPLERS:

[illegible]

NOTE: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes ☒, No ☐, Name(s): South Frying Pan Creek

Dry streambeds: Yes ☐, No ☒, Name(s): _____

Other surface water: Yes ☐, No ☒, Name(s)/Description: _____

Waste materials within any floodplain: Yes ☐, No ☒ Source ID(s): Dump at South Frying Pan Creek inventoried under 01-211.

Approximate Flood frequency? ☐ 1 yr, ☐ 10 yr, ☐ 100 yr N/A

Estimated seasonal flow of stream(s) (cfs/gpm)? 0.5 cfs (1993 invest.)
High Flow: 2.0 cfs, Average Flow: 0.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 300 feet

Surface water draining onto or through waste sources: Yes ☐, No ☒, Describe: _____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Sources of water supply for irrigation and stock watering, and domestic uses possible in the region.

Observed erosional/sedimentation/stream turbidity problems? Yes ☐, No ☒. Distance downstream (ft)? 0-500 ☐; 500-1,000 ☐; >1,000 ☐.
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): _____

SAMPLERS:

[illegible]

4 (N) purnam 20 (N) purnam : 6074

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 5 acres of flat land

Wetlands present: Yes X, No , Describe: Minor, along stream

Carbonate rocks/soils: Yes , No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X; 10-30 ; 30-100 ; 100-300 ; 300-1,000 ; 1,000-3,000 ; 3,000-10,000 ; 10,000 or greater ; Comments

Nearest residence: <1,000 ft; 1,000 ft - 0.5 miles; X >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:

observed high moderate low none

SAMPLERS:

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10____; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments None

Evidence of recreational use on site: Yes X, No____, Describe:_____

Accessibility (check each that apply): Easily accessible - no fences,
gates, or warning signs; X Moderately Accessible - barbed wire fences,
road gated, or signs posted; Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High X, Medium____, Low____

Wetlands Frontage - High____, Medium X, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes____, No X, Number____, types and locations:_____

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

AEPCO, Inc., Preliminary Assessment for Thorium City Waste Dump Site, Grant, Beaverhead County, Montana, Prepared for the U.S. Department of Interior/Bureau of Land Management, October 3, 1986.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB, 1993 Hazardous Materials Inventory Project Report, South Frying Pan Creek (01-211), February 1994.

USGS, Topographic Map, Lemhi Pass, Montana, 7 1/2 minute Quadrangle, 1988.

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

SOLID MATRIX ANALYSES

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
01-211-SE-1	9.79 U	234 J	1.9 U	3.15	7.94	7.45	5530	0.057 U	84	13.6 J	13.4 U	12.9 U	25.4	NR
01-211-SE-2	7.01 U	63.8 J	1.3 U	2.65	6.83	2.56	5310	0.04 U	141	8.13 J	9.61 U	10.3 J	15.5	NR
01-211-WR-1	89.3	4520 J	2.5	26.2	4.58	442	15800	0.565 J	6620	18.3 J	1120	28.5 J	420	NR
01-211-WR-2	6.5	371 J	0.9 U	9.62	16.1	43.3	6780	0.156 J	1010	18.4 J	90.7	6.27 U	72.8	NR

Acid/Base Accounting

[illegible]

Metals in Water	Results in ug/L
Aluminum	0.000000
Barium	0.000000
Bismuth	0.000000
Boron	0.000000
Bromine	0.000000
Cadmium	0.000000
Calcium	0.000000
Chromium	0.000000
Copper	0.000000
Fluorine	0.000000
Gold	0.000000
Iron	0.000000
Lead	0.000000
Lithium	0.000000
Magnesium	0.000000
Manganese	0.000000
Mercury	0.000000
Molybdenum	0.000000
Nickel	0.000000
Phosphorus	0.000000
Potassium	0.000000
Selenium	0.000000
Silver	0.000000
Sodium	0.000000
Sulfur	0.000000
Tin	0.000000
Titanium	0.000000
Vanadium	0.000000
Zinc	0.000000

FIELD	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	CALC.
ID													(mg CaCO ₃ /L)	
01-211-SW-1	1.9	32.3	2.57 U	9.7 U	6.83 U	1.55 U	64.7	0.12 UJX	7.37	14	3.88 J	30.7 U	7.57 U	22.7
01-211-SW-2	0.96 U	28.9	2.57 U	9.7 U	6.83 U	1.55 U	48.5	0.15 JX	9.2	17.6	2.26 J	30.7 U	8.9 J	20.9

U = Not Detected; J = Estimated Quantity; X = Outlier for Accuracy or Precision; NR = Not Requested

Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO ₃ /NO ₂ -N	CYANIDE
01-211-SW-1	50	< 5.0	< 5	< 0.05	NR
01-211-SW-2	55	< 5.0	< 5	< 0.05	NR

LEGEND

SE1 - Downstream on South Frying Pan Creek.
SW1 - Same as sample SE1.
SE2 - Upstream on South Frying Pan Creek.
SW2 - Same as sample SE2.

WR1 - South of dump #1; sample of the WR1 subsample.
WR2 - Northwest side of dump #1; sample of the WR2 subsample.
BACKGROUND - From the Last Chance #1/ER (01-216-SS-1).

TABLE 3-1
SUMMARY OF ENVIRONMENTAL MONITORING RESULTS

THORLUM CITY WASTE DUMP, GRANT, BEAVERHEAD COUNTY, MONTANA
BLM SITE CODE: MT 01411A0001
AEPCC SITE NO. 9, GROUP 0
DATE OF MONITORING: APRIL 24, 1986

MONITORING STATION	MILITARY TIME	LOCATION OF READINGS	HNU PHOTO- IONIZER (ppm Benzene)	METHANE DETECTOR (ppm)	RADIOMETER (mR/hr)	EXPLOSIMETER/ OXYGEN METER		WIND SPEED (mph) and DIRECTION
						OXYGEN %	EXPLOSION LEVEL (%)	
01	11:35	Access road leading to site, about 300 feet south of Pit #1. (Background)	0.0	ND	0.01	17.0	0.01	Calm
02*	11:44	Eastern end of Trench. Material was reddish brown in color.	0.0	ND	0.08-2.0	17.0	0.01	Calm
03	11:46	Eastern end of Trench, near Monitoring Station 02.	0.0	ND	0.1	17.0	0.01	Calm
04	11:48	Eastern end of Trench	0.0	ND	0.04	17.0	0.01	Calm
05	11:49	Northern bank of Trench, near the spoil pile. Spoil material comprised of sand, gravel and fragments of rock, reddish brown in color.	0.0	ND	0.04	17.0	0.01	Calm
06	11:51	Northern bank of Trench	0.0	ND	0.04	17.0	0.01	Calm
07	11:52	Northern bank of Trench	0.0	ND	0.04	17.0	0.01	Calm
08	12:25	At the center of Pit #1. Silty gravel, dark gray in color.	0.0	ND	0.02-0.05	17.0	0.01	5-8 (NW)
09	12:28	In Pit #2. Silty gravel; dark gray in color.	0.0	ND	0.02-0.05	17.0	0.01	5-8 (NW)
10	12:30	In Pit #3. Silty gravel, dark gray in color.	0.0	ND	0.02-0.05	17.0	0.01	5-8 (NW)
11*	12:35	In Pit #4. Silty gravel, reddish material/rock fragments.	0.0	ND	> 2.0	17.0	0.01	5-8 (NW)
12	12:39	In Pit #5. Dark gray gravelly silt.	0.0	ND	0.05	17.0	0.01	Calm
13*	12:47	In Pit #6. Reddish material and rock fragments.	0.0	ND	> 1.0	17.0	0.01	Calm
14*	12:51	On the northeastern portion of Pit #7.	0.0	ND	0.2-0.4	17.0	0.01	Calm
15*	12:55	In and around Pit #8.	0.0	ND	0.02-0.4	17.0	0.01	Calm
16	13:05	Surface water runoff east of the Trench	0.0	ND	0.01	17.0	0.01	Calm
17	13:06	A depression area filled with runoff water.	0.0	ND	0.01	17.0	0.01	Calm
18**	13:18	At the entrance to the adit below Trench. Material was reddish in color and very similar to those in the Trench.	0.0	ND	0.02-0.1	17.0	0.01	Calm
19**	13:20	On the spoil pile dumped on the northern bank of South Frying Pan Creek. Material was reddish in color and very similar to those found in the Trench.	0.0	ND	0.05- >2.0	17.0	0.01	Calm

* A grab waste/soil sample was collected at each of these stations.

** A grab surface water sample was collected at each of these stations.

Low oxygen readings may be possible, due to the high altitude.

TABLE 4-1
CONCENTRATIONS OF HSL METALS AND OTHER PARAMETERS IN WASTE
AND SURFACE WATER SAMPLES

THORIUM CITY WASTE DUMP, GRANT, BEAVERHEAD COUNTY, MONTANA.
BLM SITE CODE: MT 1411A0001
AEPSCO SITE 9, GROUP D

PARAMETER	WASTE			RCRA STANDARD***	SURFACE WATER			NATIONAL DRINKING WATER STANDARD#
	UNIT	STATION WS-A*	DETECTION LIMIT**		UNIT	STATION SW-A	DETECTION LIMIT**	
Silver (Ag)	ug/L	< 10	5,000	5,000	ug/L	<10	10	50
Arsenic (As)	ug/L	< 10	5,000	5,000	ug/L	<10	10	50
Boron (B)	ug/L	...	...	...	ug/L	<50	...	...
Barium (Ba)	ug/L	1,170	100,000	100,000	ug/L	...	...	...
Beryllium (Be)	ug/L	...	...	...	ug/L	<5	5	...
Cadmium (Cd)	ug/L	< 5	1,000	1,000	ug/L	<5	5	10
Cobalt (Co)	ug/L	...	...	...	ug/L	<50	50	...
Chromium (Cr)	ug/L	< 10	5,000	5,000	ug/L	<10	10	50
Copper (Cu)	ug/L	...	...	...	ug/L	<25	25	1,000
Mercury (Hg)	ug/L	< 0.2	200	200	ug/L	<0.2	0.2	2
Manganese (Mn)	ug/L	...	...	...	ug/L	947	15	50
Nickel (Ni)	ug/L	...	...	...	ug/L	<40	40	...
Lead (Pb)	ug/L	< 5	5,000	5,000	ug/L	<5	5	50
Selenium (Se)	ug/L	< 5	1,000	1,000	ug/L	<5	5	10
Thallium (Tl)	ug/L	...	...	...	ug/L	<10	10	...
Vanadium (V)	ug/L	...	...	...	ug/L	<50	50	...
Tungsten (W)	ug/L	...	...	...	ug/L	...	...	...
Gold (Au)	ug/L	...	...	...	ug/L	...	...	...
Iron (Fe)	ug/L	...	...	...	ug/L	...	...	...
Zinc (Zn)	ug/L	...	...	...	ug/L	...	...	...
Percent Solids	(%)	82.08	...	...	...	...	...	...
Ignitability: Flash Point	deg. C	>200	...	...	...	...	...	...
Corrosivity: pH	Std. Unit	7.3##	...	<2 or >12	Std. Unit	...	...	6.5-8.5
Reactivity:								
Total Sulfide	mg/Kg	0.64	...	...	...	...	...	...
Total Cyanide	mg/Kg	< 0.5	...	...	...	...	...	...

WS-A = Waste Sample A
SW-A = Surface Water Sample A
* Extraction Procedure (EP) toxicity test results
** EPA detection limits based on zero dilution
*** Resource Conservation and Recovery Act
Lower value of National Interim Primary and Secondary Drinking Water Standards
pH greater than 2 and less than 12 indicates noncorrosive characteristics.
ND = Not detected or below detection limit
... Not applicable or analysis not requested.

TABLE 4-6
CONCENTRATIONS OF RADIOACTIVE SUBSTANCES
IN WASTE AND SURFACE WATER SAMPLES

THORIUM CITY WASTE DUMP, GRANT, BEAVERHEAD COUNTY, MONTANA.
BLM SITE CODE: MT 1411A0001
AEPCO SITE 9, GROUP D

PARAMETER	WASTE		SURFACE WATER	
	UNIT*	STATION WS-A	UNIT*	STATION SW-A
Thorium-228	pci/g	18 ± 2	pci/L	< 0.2
Thorium-230	pci/g	0.18 ± 0.11	pci/L	< 0.4
Thorium-232	pci/g	14 ± 2	pci/L	< 0.2
Thorium-234	pci/g	24 ± 2	pci/L	< 50
Gross Alpha	pci/g	93 ± 16	pci/L	...
Gross Beta	pci/g	75 ± 4	pci/L	...
Radon	pci/g	< 1	pci/L	...
Lead-210	pci/g	0.93 ± 0.17	pci/L	...

WS-A = Waste Sample A

SW-A = Surface Water Sample A

* pci = picocurie

... Test not performed

TABLE 4-5
CONCENTRATIONS OF PESTICIDE AND PCBs
IN WASTE SAMPLES

THORIUM CITY WASTE DUMP , GRANT, BEAVERHEAD COUNTY, MONTANA.
BLM SITE CODE: MT 1411A0001
AEP CO SITE 9; GROUP D

PARAMETER	UNIT	WASTE	
		STATION WS-A	DETECTION LIMIT
Aldrin	ug/Kg	ND	1,000
Alpha-BHC	ug/Kg	ND	1,000
Beta-BHC	ug/Kg	ND	1,000
Gamma-BHC	ug/Kg	ND	1,000
Delta-BHC	ug/Kg	ND	1,000
Chlorodane	ug/Kg	ND	1,000
4,4'-DDT	ug/Kg	ND	1,000
4,4'-DDE	ug/Kg	ND	1,000
4,4'-DDD	ug/Kg	ND	1,000
Dieldrin	ug/Kg	ND	1,000
Alpha-Endosulfan	ug/Kg	ND	1,000
Beta-Endosulfan	ug/Kg	ND	1,000
Endosulfan sulfate	ug/Kg	ND	1,000
Endrin	ug/Kg	ND	1,000
Endrin aldehyde	ug/Kg	ND	1,000
Heptachlor	ug/Kg	ND	1,000
Heptachlor epoxide	ug/Kg	ND	1,000
PCB-1242 (Aroclor 1242)	ug/Kg	ND	1,000
PCB-1254 (Aroclor 1254)	ug/Kg	ND	1,000
PCB-1221 (Aroclor 1221)	ug/Kg	ND	1,000
PCB-1232 (Aroclor 1232)	ug/Kg	ND	1,000
PCB-1248 (Aroclor 1248)	ug/Kg	ND	1,000
PCB-1260 (Aroclor 1260)	ug/Kg	ND	1,000
PCB-1016 (Aroclor 1016)	ug/Kg	ND	1,000
Toxaphene	ug/Kg	ND	10,000
DILUTION RATIO	---	100X	10,000X

WS-A = Waste Sample A

ND = Not detected or below detection limit

--- Not applicable

TABLE 4-4
CONCENTRATIONS OF BASE/NEUTRAL EXTRACTABLE ORGANIC COMPOUNDS
IN WASTE SAMPLES

THORIUM CITY WASTE DUMP, GRANT, BEAVERHEAD COUNTY, MONTANA.
BLM SITE CODE: MT 1411A0001
AEPCC SITE 9; GROUP D

PARAMETER	UNIT	WASTE	
		STATION WS-A	DETECTION LIMIT
Acenaphthene	ug/Kg	ND	1,000
Acenaphthylene	ug/Kg	ND	1,000
Aniline	ug/Kg	ND	1,000
Anthracene	ug/Kg	ND	1,000
Benzo (a) anthracene	ug/Kg	ND	1,000
Benzo (a) pyrene	ug/Kg	ND	1,000
Benzo (b) Fluoranthene	ug/Kg	ND	1,000
Benzo (ghi) perylene	ug/Kg	ND	1,000
Benzo (k) fluoranthene	ug/Kg	ND	1,000
Benzidine	ug/Kg	ND	1,000
Benzyl alcohol	ug/Kg	ND	1,000
3,4-Benzofluoranthene	ug/Kg	ND	1,000
Bis (2-chloroethyl) ether	ug/Kg	ND	1,000
Bis (2-chloroisopropyl) ether	ug/Kg	ND	1,000
Bis (2-chloroethoxy) methane	ug/Kg	ND	1,000
Bis (2-chloroisopropyl) ether	ug/Kg	ND	1,000
Bis (2-ethylhexyl) phthalate	ug/Kg	ND	1,000
4-Bromophenyl phenyl ether	ug/Kg	ND	1,000
Butyl benzyl phthalate	ug/Kg	ND	1,000
4-Chloroaniline	ug/Kg	ND	1,000
2-Chloronaphthalene	ug/Kg	ND	1,000
4-Chlorophenyl phenyl ether	ug/Kg	ND	1,000
Chrysene	ug/Kg	ND	1,000
Dibenzo (a,h) anthracene	ug/Kg	ND	1,000
Dibenzofuran	ug/Kg	ND	1,000
1,2-Dichlorobenzene	ug/Kg	ND	1,000
1,3-Dichlorobenzene	ug/Kg	ND	1,000
1,4-Dichlorobenzene	ug/Kg	ND	1,000
3,3-Dichlorobenzidine	ug/Kg	ND	1,000
2,4-Dinitrotoluene	ug/Kg	ND	1,000
2,6-Dinitrotoluene	ug/Kg	ND	1,000
1,2-Diphenylhydrazine (as azobenzene)	ug/Kg	ND	1,000
Di-n-butyl phthalate	ug/Kg	ND	1,000
Di-n-octyl phthalate	ug/Kg	ND	1,000
Diethyl phthalate	ug/Kg	ND	1,000
Dimethyl phthalate	ug/Kg	ND	1,000
Fluoranthene	ug/Kg	ND	1,000
Fluorene	ug/Kg	ND	1,000
Hexachlorobenzene	ug/Kg	ND	1,000
Hexachloroethane	ug/Kg	ND	1,000
Hexachlorobutadiene	ug/Kg	ND	1,000
Hexachlorocyclopentadiene	ug/Kg	ND	1,000
Indeno (1,2,3-cd) pyrene	ug/Kg	ND	1,000
Isophorone	ug/Kg	ND	1,000
2-Methylnaphthalene	ug/Kg	ND	1,000
Naphthalene	ug/Kg	ND	1,000
2-Nitroaniline	ug/Kg	ND	1,000
3-Nitroaniline	ug/Kg	ND	1,000
4-Nitroaniline	ug/Kg	ND	1,000
Nitrobenzene	ug/Kg	ND	1,000
N-Nitrosodimethylamine	ug/Kg	ND	1,000
N-Nitrosodiphenylamine	ug/Kg	ND	1,000
N-Nitrosodi-N-Propylamine	ug/Kg	ND	1,000
Phenanthrene	ug/Kg	ND	1,000
Pyrene	ug/Kg	ND	1,000
1,2,4-Trichlorobenzene	ug/Kg	ND	1,000
DILUTION RATIO	---	1X	1X

WS-A = Waste Sample A

ND = Not detected or below detection limit

--- Not applicable

TABLE 4-3
CONCENTRATIONS OF ACID EXTRACTABLE ORGANIC COMPOUNDS
IN WASTE SAMPLES

THORIUM CITY WASTE DUMP , GRANT, BEAVERHEAD COUNTY, MONTANA.
BLM SITE CODE: MT 01411A0001
AEPCO SITE 9; GROUP D

PARAMETER	WASTE		
	UNIT	STATION WS-A	DETECTION LIMIT
Benzoic Acid	ug/Kg	ND	5,000
2-Chlorophenol	ug/Kg	ND	1,000
2,4-Dichlorophenol	ug/Kg	ND	1,000
2,4-Dimethylphenol	ug/Kg	ND	1,000
4,6-Dinitro-o-cresol	ug/Kg	ND	5,000
2,4-Dinitrophenol	ug/Kg	ND	5,000
2-Methylphenol	ug/Kg	ND	1,000
4-Methylphenol	ug/Kg	ND	1,000
2-Nitrophenol	ug/Kg	ND	1,000
4-Nitrophenol	ug/Kg	ND	5,000
p-Chloro-m-cresol	ug/Kg	ND	1,000
Pentachlorophenol	ug/Kg	ND	5,000
Phenol	ug/Kg	ND	1,000
2,4,5-Trichlorophenol	ug/Kg	ND	5,000
2,4,6-Trichlorophenol	ug/Kg	ND	1,000
DILUTION RATIO	---	100X	100X

WS-A = Waste Sample A

--- Not applicable

ND = Not detected or below detection limit

TABLE 4-2
CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS
IN WASTE SAMPLES

THORIUM CITY WASTE DUMPS, GRANT, BEAVERHEAD COUNTY, MONTANA.
BLM SITE CODE: MT 01411A0001
AEPCO SITE 9; GROUP D

PARAMETER	UNIT	WASTE	
		STATION WS-A	DETECTION LIMIT
Acetone	ug/Kg	440	10
Benzene	ug/Kg	ND	10
Bromoform	ug/Kg	ND	10
2-Butanone	ug/Kg	ND	10
Carbon Tetrachloride	ug/Kg	ND	10
Carbon Disulfide	ug/Kg	ND	10
Chlorobenzene	ug/Kg	ND	10
Chlorodibromomethane	ug/Kg	ND	10
Chloroethane	ug/Kg	ND	10
2-Chloroethylvinylether	ug/Kg	ND	10
Chloroform	ug/Kg	ND	10
cis-1,3-Dichloropropane	ug/Kg	ND	10
Dichlorobromomethane	ug/Kg	ND	10
1,1-Dichloroethane	ug/Kg	ND	10
1,2-Dichloroethane	ug/Kg	ND	10
1,1-Dichloroethylene	ug/Kg	ND	10
1,2-Dichloropropane	ug/Kg	ND	10
Trans-1,3-Dichloropropene	ug/Kg	ND	10
Ethylbenzene	ug/Kg	ND	10
2-Hexanone	ug/Kg	ND	10
Methyl bromide	ug/Kg	ND	10
Methyl chloride	ug/Kg	ND	10
Methylene Chloride	ug/Kg	ND	10
4-Methy-2-Pentanone	ug/Kg	ND	10
Styrene	ug/Kg	ND	10
1,1,2,2-Tetrachloroethane	ug/Kg	ND	10
Tetrachloroethylene	ug/Kg	ND	10
Toluene	ug/Kg	ND	10
1,2-trans-Dichloroethylene	ug/Kg	ND	10
1,1,1-Trichloroethane	ug/Kg	ND	10
1,1,2-Trichloroethane	ug/Kg	ND	10
Trichloroethylene	ug/Kg	ND	10
Trichlorofluoromethane	ug/Kg	ND	10
Vinyl Chloride	ug/Kg	ND	10
Vinyl Acetate	ug/Kg	ND	10
Total Xylenes	ug/Kg	ND	10
DILUTION RATIO	---	1X	1X

WS-A = Waste Sample A

ND = Not detected or below detection limit

--- Not applicable

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**THORIUM CITY
PA NO. 01-500**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Thorium City
01-500

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.015
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	1
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 1.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 3
		SURFACE WATER PATHWAY	
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE	0
12		EXCEEDENCES	0
13A		CONTAINMENT	20
13B		DISTANCE TO SW	2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.030
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	10
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 18
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 22
		AIR PATHWAY	
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE	0
26A		CONTAINMENT	5
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 25
27		LIKELIHOOD SCORE	LINES 25 + 26C 25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.001
29	AIR - TARGETS	POPULATION - 4 MILES	1
30		NEAREST RESIDENCE	0
31		WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 11
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 0
		DIRECT CONTACT PATHWAY	
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE	50
37A		ACCESSIBILITY	10
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 50
38		LIKELIHOOD SCORE	LINES 36 + 37C 100
39	D.C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.001
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	0
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	2
43		TARGETS SCORE	SUM LINES 40 THRU 42 2
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 0
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		(LINES 10 + 24 + 35 + 44) / 100,000 0.00

SITE NAME:
PA NUMBER:

Thorium City
01-500

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	0.00

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: BULLION KING PA#: 04-081

Date: June 20, 1994 Time: 1130-1600

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Sunny; clear; warm; slight breeze; late spring, early summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: WR-1; #2: Collapsed shaft at WR-1; #3: GW-1 sample location; #4: WR-3 dump, Shaft #2; #5: AD-1 sample location, adit discharge from collapsed adit; #6: WR-2, north end; #7: WR-2, from east.
Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Part of this site was sampled during 1993 investigation of the Park/Marietta site (04-012).

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Treat adit discharge if risk assessment deems it necessary. Remove waste rock from drainage.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BULLION KING PA#: 04-081

Legal Description: T 7N ; R 1W ; Sec. 10 , SE 1/4 SE 1/4 1/4
Sec. 14 , NW 1/4 NW 1/4 1/4
Sec. 15 , NE 1/4 NE 1/4 1/4

County: BROADWATER Mining District: INDIAN CREEK

Latitude: N 46° 22' 12" Longitude: W 111° 42' 12"

Primary Drainage Basin and Code: Missouri River/10030101

Secondary Drainage Basin: Indian Creek

USGS Quadrangle map name(s): Giant Hill

Mine Type/Commodities: Hardrock/Silver, Lead, Gold

Activity Status: Active ☐ , Inactive/Exploration ☐ , Abandoned ☒ .

Ownership: Known ☒ Y ☐ N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Harry Eanders,
4834 Blue Ridge Drive, San Jose, CA 95129.

Relationship to other mines/sites in the area/district: North of
the Little Annie Mine approx. 1/4 mile; northwest approx. 1/4 mile
of Marietta and Park Mines; southwest of Big Chief approx. 1/4 to
1/2 mile.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 7480'-7520' , Slope 15°-20° ,
Aspect Southwest

Land use: Mining ☐ , Recreational ☒ , Residential ☐ , Urban ☐ ,
Agricultural ☐ , Other (Specify) _____

Area of disturbed/unvegetated lands? Approx. 2.5 acre(s).

Site Dimensions: _____

Predominant vegetation types: Meadow grasses, fir/pine trees

Access: roads - good (paved) ☐ , poor (maintained dirt road) ☒ ,
4wd ☐ , trail ☐ .

Other logistical considerations (proximity to other sites). Above
(north) the Park and Marietta mines; south of Vosburg mine.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is underlain by Elkhorn Mountain Volcanics. Site lies on both sides (east and west) of dry drainage to Indian Creek. Water leaving the site would flow south to confluence with Indian Creek 1/3 mile away; Indian Creek then flows southeast to the Missouri River.

Mining/milling history, ore type/tenor, host rock, gangue: Located on the Queen of the Park claim. High grade silver-lead ore reported from a vertical pipe along a north-trending fault. Veins contain pyrite, arsenopyrite, galena, sphalerite, and sparse chalcopyrite in gangue of quartz. Three hundred and forty tons of ore were reported produced from 1896 to 1919 and indicated tenor of 12 oz. silver per ton and 55% lead.

Mine Operation?

Shafts - Yes X, No , # 2, Comment Caved
Adits - Yes X, No , # 1, Comment Caved
Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes X, No , # , Comment Several trenches and small pits

Mill Operation? Yes , No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



50 0 50 100 200
SCALE IN FEET

20 10 0 10 20 100
SCALE IN METERS

RUST STAINED
DUMP FROM A
PROSPECT
AREA= 410 SD.M.
4420 SQ.FT.
490 SQ.YDS.
VOLUME= 490 CU.YDS.

ROAD #405

ROAD

ROAD

OUTHOUSE

CABIN

CABIN

TRENCH #3
DISCHARGE

GW-1

COLLAPSED
WOODEN BLDG

TRENCH 3
TOTAL DISTURBED
GROUND
AREA= 1880 SQ.M.
20250 SQ.FT.
2250 SD.YDS.
VOLUME= 2250 CU.YDS.

SEEPS INTO
GROUND

TRENCH 2
TOTAL DISTURBED
GROUND
AREA= 1240 SQ.M.
13310 SQ.FT.
1480 SQ.YDS.
VOLUME= 1480 CU.YDS.

WR1
AREA= 1010 SD.M.
10860 SQ.FT.
1210 SQ.YDS.
VOLUME= 1810 CU.YDS.

SUBSIDENCE
10' DEEP
TOTAL DISTURBED
GROUND
AREA= 820 SQ.M.
8770 SQ.FT.
970 SQ.YDS.
VOLUME= 970 CU.YDS.

TOP
SADDLE

HIGH SULFIDE DUMP

WR2 (ALSO WR9 FOR PA# 04-012)
AREA= 2300 SD.M.
24795 SQ.FT.
2755 SQ.YDS.
VOLUME= 4590 CU.YDS.

CREEK COMES FROM
UNDERGROUND
(PARAMETERS)

SW-1

PROSPECTS

SHAFT #2
15' DEEP

WR3
AREA= 455 SD.M.
4915 SQ.FT.
545 SQ.YDS.
VOLUME= 546 CU.YDS.

MARIETTA
DUMP

SW-2

SEEPS BACK
INTO GROUND

LEGEND

- | | | | |
|----------------|------------------------------------|-------|-------------------------------------|
| ⊗ | XRF SAMPLE | == | IMPROVED ROAD |
| ⊗ ^W | WATER SAMPLE
GROUND AND SURFACE | - - - | UNIMPROVED ROAD |
| - | OPEN ADIT | ▢ | STRUCTURE |
| -X- | COLLAPSED ADIT | ⬮ | EXCAVATION |
| ⊠ | OPEN SHAFT | ⬮ | SLOPE DIRECTION |
| ⊠ | COLLAPSED SHAFT | ⬮ | WASTE ROCK DUMP
OR TAILINGS PILE |
| → | DRAINAGE | | |
| → | DRY DRAINAGE | | |

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

BULLION KING
PA# 04-081

DRAWING NO.: PT340209

REV: -

DATE: 9/8/94

PLOT SCALE: 1 = 50

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay):
N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	1,610	East dump with shaft, south side	None	5.8 (D)	0.04	04-081-WR-1	06/27/94 1412	T-Metals, ABA
WR-1B	WR		East dump with shaft, east side	None	6.4 (D)	0.04			
WR-1C	WR		East dump with shaft, west side	None	6.5 (D)	0.04			
WR-2A	WR	4,590	West dump with adit, south side	None	5.5 (D)	0.03	04-081-WR-2	06/27/94 1420	T-Metals, ABA
WR-2B	WR		West dump with adit, middle	None	5.3 (D)	0.03			
WR-2C	WR		West dump with adit, north end	None	5.2 (D)	0.02			
WR-3	WR	545	Lower west dump with shaft, center	None	4.0 (D)	0.05			

*Direct reading (Kelway Meter) / 8-9 saturated Paste (Orion Meter)

Comments or deviations from SOPs: 04-081-WR-1 is composite of WR-1A through -1C. 04-081-WR-2 is composite of WR-2A through -2C and WR-3. Dump WR-2 corresponds with WR-9 of Park (04-012). See Park (04-012) for background soil sample (1993 inventory data).

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 1 Identification: AD-1 at WR-2

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes X, No , Number: 1 Identification: GW-1 at trench

Groundwater wells within 4 miles?: Yes X, No ;

Number of well logs: 14

Distance to nearest well used for drinking:

 <1,000 ft; 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable X, Possible , Unlikely .

High metals in dumps with abundant sulfides. Many seeps indicating shallow groundwater. Adit discharge seeps into dump.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: Exploration trench 200 feet west of Eastern shaft and dump has groundwater discharge (good quality).

SAMPLERS: Belanger

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): AD-1 corresponds to GW-3 in 1993 inventory from the Park/Marietta site (04-012).

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes X, No____, Name(s): Dry tributary of Indian Creek; spring discharge appears in drainage then disappears 200' down drainage, reappears within the Park site.

Other surface water: Yes____, No X, Name(s)/Description: Spring present in the meadow between WR-1 and WR-2; water seeps back into the ground.

Waste materials within any floodplain: Yes____, No X Source ID(s): _____

Approximate Flood frequency? ____1 yr, ____10 yr, ____100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)? Approx. 50 feet from WR-3 to dry drainage

Surface water draining onto or through waste sources: Yes X, No____, Describe: Adit discharges onto WR-2 then disappears.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Irrigation, agriculture, wetlands at the Missouri River; possibly T&E habitat.

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000____. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Downstream disturbance by Park and Marietta mines.

SAMPLERS: Belanger

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 20 acres of meadows

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; ___1,000 ft - 0.5 miles; X>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, West

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FE0X	Dry	10,860	10,860	Yes	Low
WR-2	FE0X; SO3	Partial	24,795	17,360	Yes	Low
WR-3	FE0X; SO3; pH	Dry	4,915	4,915	Yes	Low
AD-1	FE0X	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes X, No____, Describe: Pop
cans; rock collectors

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage____; Secondary Drainage X; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium X, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 5

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes____, No X, Number____, types and locations:_____

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 3,
types and locations: 2 trenches, 1 caved shaft with steep slopes

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

- MBMG, Ore Deposits of the Northern Part of the Park (Indian Creek) District, Broadwater County, Montana, Bulletin 35, Written by Elmer M. Schell, June 1963.
- MBMG, Well Log Database, July 14, 1994.
- MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.
- MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Bullion King, Prepared by Northern Engineering and Testing, May 13, 1988.
- USGS, Geology and Mineral Deposits, East Flank of the Elkhorn Mountains, Broadwater County, Montana, Professional Paper 665, Author Unknown, Date Unknown.
- USGS, Topographic Map, Giant Hill, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

**BULLION KING
PA NO. 04-081**

Bullion King PA# 04-081
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/20/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
04-081-WR1	43.9	77.3	179	11.8 J	20.8	4.7	1320	58400	1.51 JX	37100	1.5 U	47900	28.3 J	1070 J	NR
04-081-WR2	31.9	3190	104	1.1 J	4.1	5.3	91.5	59200	0.98 JX	290	1.4 U	8160	5.8 J	350 J	NR
BACKGROUND	NR	44 J	315	1.0 U	24.0 J	15.0 J	28.9 J	37600	0.088 J	1220 J	9.05 J	31	11.0 UJ	112 J	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL		SULFUR		SULFATE		PYRITIC		PYRITIC		SULFUR		SULFUR	
	SULFUR	ACID BASE	NEUTRAL	POTENT.	ACID BASE	POTENT.	SULFUR	POTENT.	SULFUR	POTENT.	ACID BASE	POTENT.	ACID BASE	POTENT.
	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t
04-081-WR1	0.96	30.0	49.0	-1.05	19.0	-65	0.10	0.40	0.46	12.5	0.46	36.5	0.52	-7.30
04-081-WR2	2.04	63.7					1.32	0.20		6.25				

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-081-AD1	0.12 U	12.3	3.6	4.9	8.7 U	4.7 UX	50.0	725	0.18	83.1	8.0 U	13.0 J	29.4 U	712	49.0
04-081-GW1	0.12 U	1.1 U	4.5	2.6 U	8.7 U	4.7 UX	4.6 U	45.7	0.11 U	4.4 U	8.0 U	1.1 U	29.4 U	5.77	29.5

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL		CHLORIDE		SULFATE		NO3/NO2-N		CYANIDE	
	DISSOLVED	SOLIDS								
04-081-AD1	4.0	<5.0			48	0.65			NR	
04-081-GW1	60	<5.0			7.0	0.15			NR	

LEGEND

WR1 - Composite of WR1A through 1C.
 WR2 - Composite of WR2A through 2C and 3.
 BACKGROUND - From the Park Mine (04-012-SS1) (1993 data).

AD1 - Acid discharge west.
 GW1 - No. 2 trench discharge, east.

XRF ANALYSIS RESULTS

**BULLION KING
PA NO. 04-081**

Mine Name: Bullion King PA# 04-081
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHl	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
04-081-WR1A		21979.6	15922.8	1677.32		13096.5	76823.4			388.717 *	410.558		77.8451
04-081-WR1B		25227.6	19873.1	1862.39		20854.1	99014.9			939.454	728.59		94.7824
04-081-WR1C		24299.3	8032.4	1764.08		11878.1	79074.4			1295.9	2063.14		88.5373
04-081-WR1-COMP		19280.7	11947.8	1372.76		13706.5	83496.4			846.22	1099.53		86.7002
04-081-WR2A		17617	10980	2662.41		1192.43 *	91178.6				615.205	1746.06	400.815
04-081-WR2B		25194.2	6402.5	3388.47		1120.36 *	92274.8				574.467	5357.99	319.76
04-081-WR2C		20128.4	18916.9	1990.27			116467				328.59	2417.89	259.502
04-081-WR2-COMP		22410.4	12399	2644.91		818.118 *	88619.4			106.248 *	618.843	4230.43	338.77
04-081-WR2-COMP-DUP		21607	10826.6	2639.21		1046.76 *	86904.2				539.195	3986.16	298.775
04-081-WR3		23203.4	2680.79	1843.55			54703.9				725.914	7613.5	168.744

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
04-081-WR1A	133.538			1468.85	136.608				638.15			
04-081-WR1B	152.343			7088.12	134.02				273.864	148.613 *		
04-081-WR1C	132.337			17126.2	130.195 *				313.16	170.908 *		
04-081-WR1-COMP	138.934		11.97 *	9076.81	129.526				390.555			
04-081-WR2A	124.816			556.204	126.483				369.525			
04-081-WR2B	154.822		16.8561 *	4368.35	168.361				444.421			
04-081-WR2C	110.142			518.827	163.322				332.69			
04-081-WR2-COMP	134.792		18.8007 *	6130.04	154.425				358.912	138.519 *		13.2547 *
04-081-WR2-COMP-DUP	133.171			5678.01	151.877				341.718			21.1496 *
04-081-WR3	149.021		14.8892 *	17068.6	118.675 *				333.955			

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**BULLION KING
PA NO. 04-081**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Bullion King
04-081

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 81.969
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	14
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 14.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 459026
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES	0
13A		CONTAINMENT	20
13B		DISTANCE TO SW	10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 89.474
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	10
19		FISHERY	1
20		RECREATION	0
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 13
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 232632
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	5
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 25
27		LIKELIHOOD SCORE	LINES 25 + 26C 25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 6.495
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31		WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 40
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 6495
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	20
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 100
38		LIKELIHOOD SCORE	LINES 36 + 37C 150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 5.921
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	1
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	5
43		TARGETS SCORE	SUM LINES 40 THRU 42 6
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 5329
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		7.03

SITE NAME:
PA NUMBER:

Bullion King
04-081

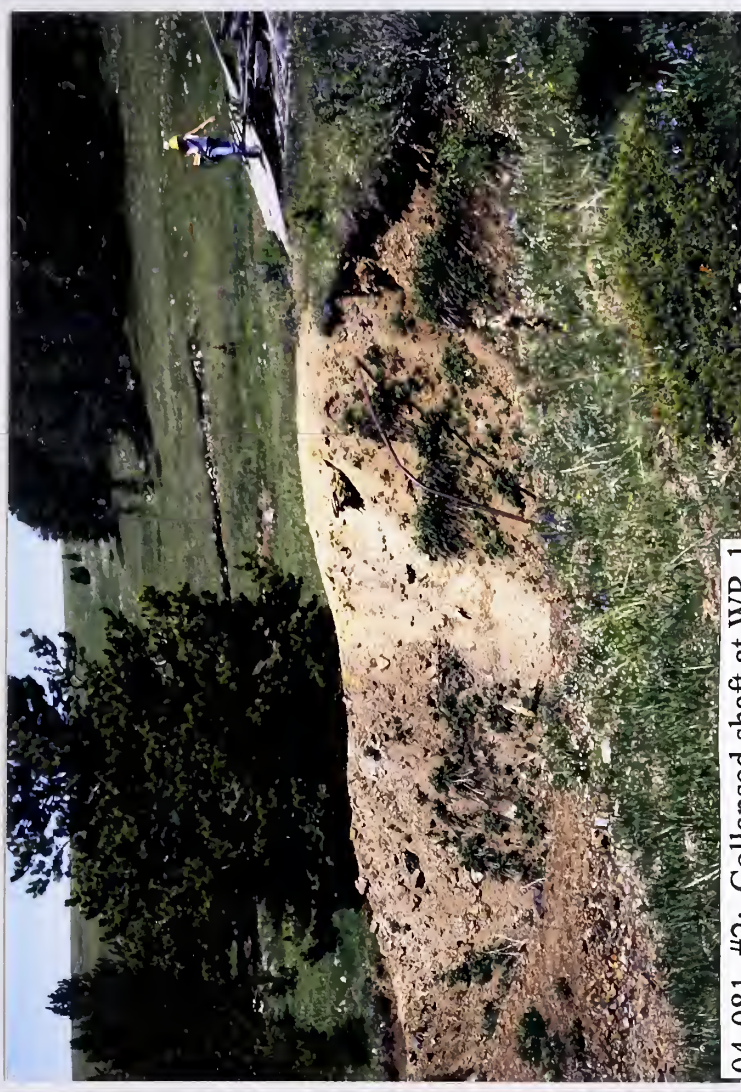
LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	225
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	225
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	27.00



04-081, #1: WR-1



04-081, #2: Collapsed shaft at WR-1



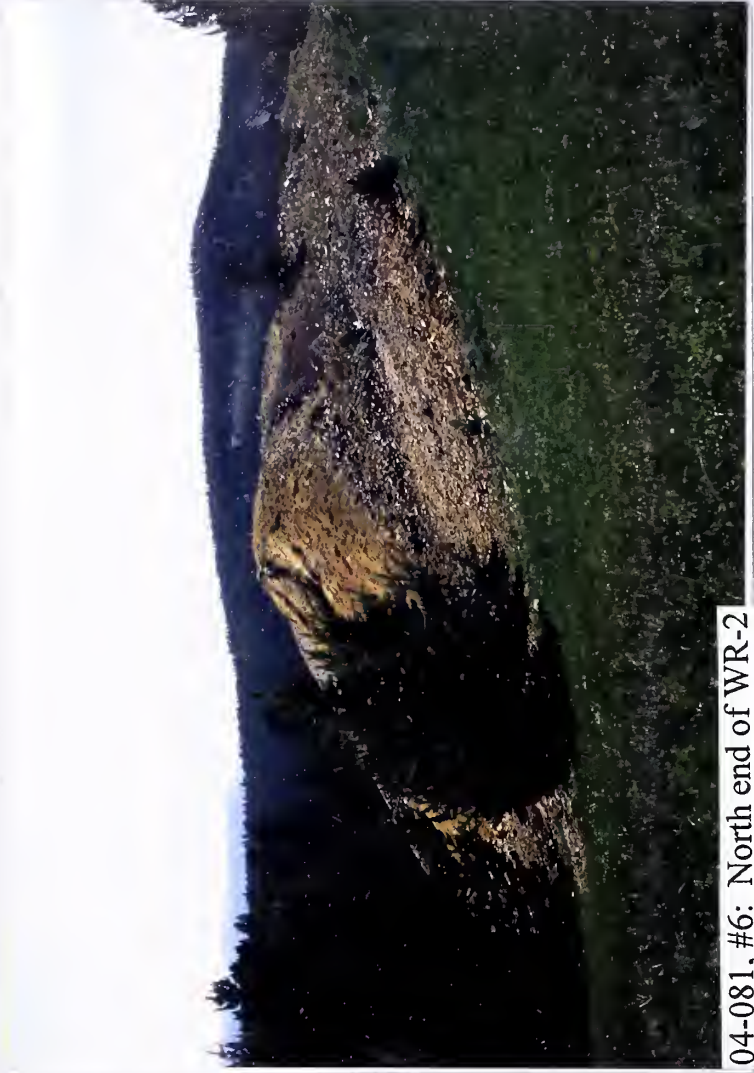
04-081, #3: Trench discharge; GW-1 sample location



04-081, #4: WR-3 and Shaft #2



04-081, #5: Collapsed Adit #1 discharge



04-081, #6: North end of WR-2



04-081, #7: WR-2 from east



MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: CUSTER MILLSITE PA#: 04-006

Date: June 22, 1994 Time: 1300-1730

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Overcast, warm, occasional breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #27: Millsite (background) and reclaimed TP-1 (foreground) facing south; #28: Middle millsite and reclaimed tailings facing southwest; #29: Old buildings and reclaimed tailings (foreground) facing west; #30: Reclaimed tailings facing northwest; #31: GW-1 sample location, monitoring well (WE-16). Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Tailings have been regraded, covered with 1 to 2 feet of topsoil and seeded with alfalfa. Very good revegetation. Mill is removed. Custer Millsite is on the General Sherman Claim.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Since tailings have already been reclaimed and revegetated, no action is required.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CUSTER MILLSITE PA#: 04-006

Legal Description: T 8N ; R 1W ; Sec. 13 , SE 1/4 1/4 1/4

County: BROADWATER Mining District: WINSTON

Latitude: N 46° 26' 48" Longitude: W 111° 39' 59"

Primary Drainage Basin and Code: Missouri River/10030101

Secondary Drainage Basin: Iron Age Gulch

USGS Quadrangle map name(s): Winston

Mine Type/Commodities: Hardrock/Gold, Lead, Zinc

Activity Status: Active ☐ , Inactive/Exploration ☐ , Abandoned ☒ .

Ownership: Known Y ☐ N ☒ ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district: Part of Chartam complex

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? In 1986, the Custer Mill tailings were reclaimed and tailings spill below the ponds were graded and seeded by Resource Engineers & Assoc. Mine application permit encompassing this area was submitted in 1987.

General site features: Elevation 4520'-4560', Slope 5°, Aspect Northeast

Land use: Mining ☒ , Recreational ☒ , Residential ☐ , Urban ☐ , Agricultural ☐ , Other (Specify)

Area of disturbed/unvegetated lands? 8 acre(s) .

Site Dimensions: 350 feet x 975 feet

Predominant vegetation types: Alfalfa, bunch grass, weeds

Access: roads - good (paved) ☐ , poor (maintained dirt road) ☐ , 4wd ☒ , trail ☐ .

Other logistical considerations (proximity to other sites). North of the Hyantha Mine; Hyantha Lode is approx. 1,700' south of the Custer shaft; 2 miles south from Winston.

Well logs within 1 mile radius; (Attach MEMG Well Log Printout(s): There are 12 wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The numerous veins in the area are in andesite of the Elkhorn volcanics near a small stock of quartz monzonite (Edna stock) and aplite. Site lies on west side of Iron Age Gulch. Water leaving the site would flow northeast to Iron Age Gulch, then north and east to confluence with unnamed tributary to an irrigation ditch. Water in the ditch flows into Canyon Ferry Reservoir approximately 4 miles southeast of the site.

Mining/milling history, ore type/tenor, host rock, gangue: Mine was located prior to 1879 and workings were inaccessible in 1952. It reopened in 1960 to 1982; recent signs of exploration work. Chiefly pyrite and smaller amounts of galena, arsenopyrite, chalcopyrite, and sphalerite in brecciated quartz and a carbonate mineral (ankerite). Custer vein is a fissure vein, cutting steeply through the andesitic volcanic rocks that are intruded by the Edna stock.

Mine Operation?

Shafts - Yes___, No X, # ___ , Comment_____
Adits - Yes___, No X, # ___ , Comment_____
Pits - Yes___, No X, # ___ , Comment_____
Placers - Yes___, No X, # ___ , Comment_____
Other - Yes___, No X, # ___ , Comment_____

Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: 1960 to 1982

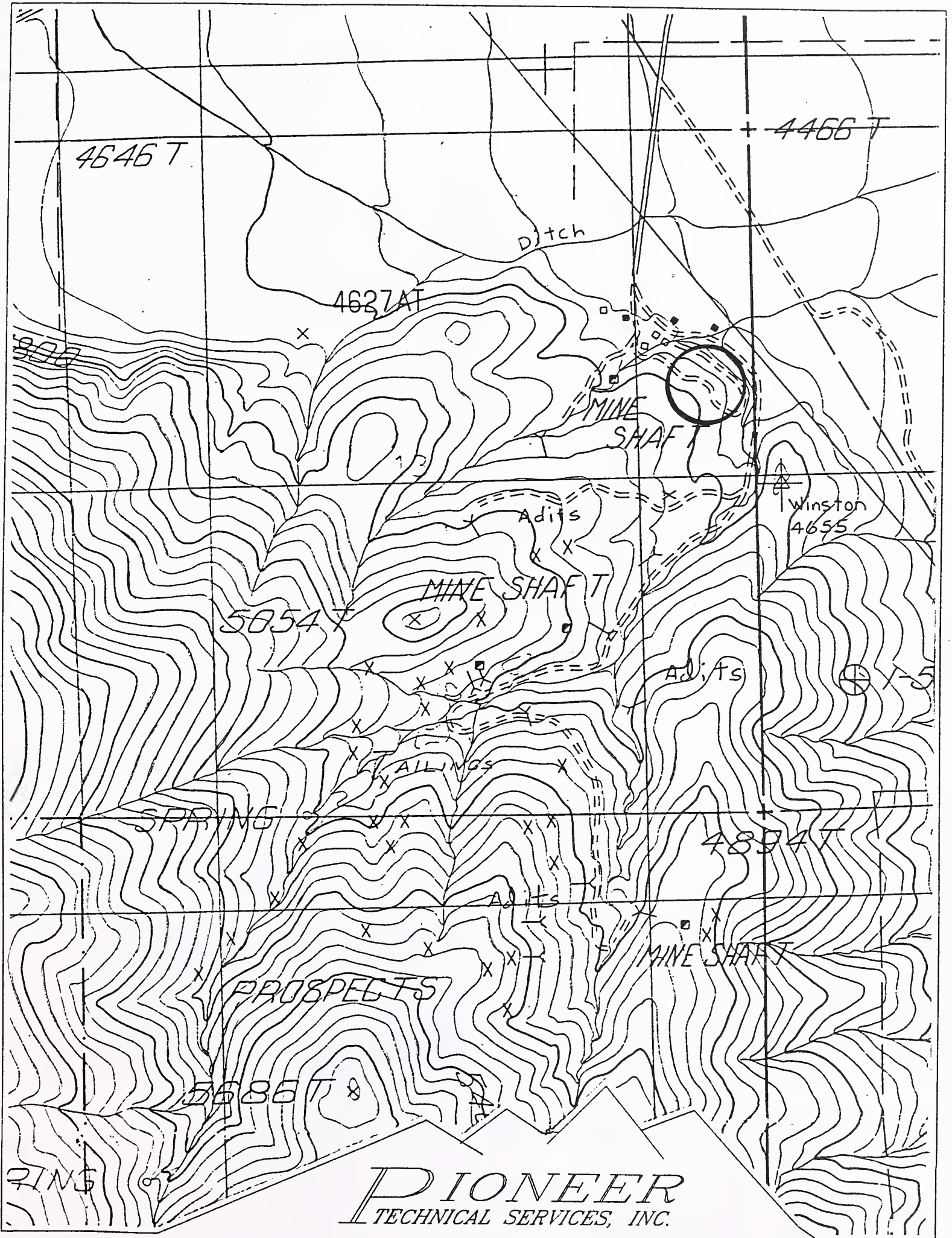
Origin of Ore Milled - Custom Mill X Dedicated Mill___; Number and names of mines that supplied mill feed: Possibly supplied by the Aurora mines, General Sherman, Lily, and other mines in the Chartam project.

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? 250 tons/day; small experimental amalgamating mill still exists.

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

Well No.	Location	Depth	Yield	Static Water Level
57132	08N 01W 12 A	500.0	5.0	20.00
M:57133	08N 01W 12 AC	300.0	5.0	51.00
M:57134	08N 01W 12 CA	200.0	10.0	24.00
M:122495	08N 01W 12 CA	160.0	3.0	47.50
M:20648	08N 01W 12 CDC	183.0	0.0	14.00
M:57135	08N 01W 13 AA	49.0	5.0	15.00
M:57137	08N 01W 13 AB	100.0	4.0	20.00
M:57136	08N 01W 13 AB	103.0	12.0	18.00
M:20649	08N 01E 18	140.0	50.0	30.00
M:20651	08N 01E 18	260.0	0.0	78.00
M:20650	08N 01E 18	200.0	8.0	40.00
M:20652	08N 01E 18 BC	71.0	17.0	50.00

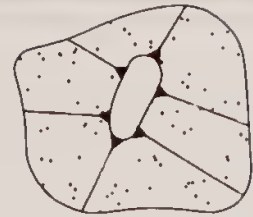


PIONEER
TECHNICAL SERVICES, INC.

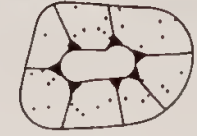
CUSTER MILLSITE, P.A. NO. 04-006

T08N, R01W, SECTION 13

SCALE: 1" = 1000'



PILES OF SOIL
NOT TAILINGS OR WASTE ROCK



FENCE

WELL WE-18
W
GW-1

TP1
COVERED AND 95% REVEGETATED
WITH GRASSES AND ALFALFA
AREA= 309990 SQ.FT.
34440 SQ.YDS.
VOLUME= 22960 CU.YDS.

⊗ C

⊗ B

⊗ A

POWER LINE

WELL?
● 5' OF CASING ABOVE GROUND

8' OF CASING ABOVE GROUND
WELL?

END OF ROAD

SMALL
VOLUME
OF TAILINGS

FORMER MILL BUILDING LOCATION,
FOUNDATION REMAINING

SMALL
HIGHWALL

IRON AGE GULCH (DRY)

TO AURORA AND CHARTAM LINES

TO SMALL EXPERIMENTAL MILL

NOT TO SCALE

LEGEND

- | | | | |
|-------------|------------------------------------|-----------|-------------------------------------|
| ⊗ | XRF SAMPLE | ===== | IMPROVED ROAD |
| ⊗
W | WATER SAMPLE
GROUND AND SURFACE | - - - - - | UNIMPROVED ROAD |
| ● | WATER WELL | ▨ | STRUCTURE |
| → | DRAINAGE | ▲ | SLOPE DIRECTION |
| - - - - - | DRY DRAINAGE | ⬢ | WASTE ROCK DUMP
OR TAILINGS PILE |
| - x - x - x | FENCE | | |

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

CUSTER MILL SITE
PA# 04-006

DRAWING NO.: PT340259
DATE: 12/5/94

REV: -
PLOT SCALE: 1" = 120'

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 75% sand, 25% silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): No impoundment, but at depth tailings are fine sand and tan in color.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Reclaimed

Comments on potential for mitigation: Already revegetated/reclaimed; no action required.

SAMPLERS: Belanger, West

D-Direct reading (Kelway Meter) ; S-Saturated Paste (Orion Meter)

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes____, No X, Number:____ Identification:_____

Filled shafts: Yes____, No X, Number:____ Identification:_____

Seeps/Springs: Yes____, No X, Number:____ Identification:_____

Groundwater wells within 4 miles?: Yes X, No____;

Number of well logs: 100

Distance to nearest well used for drinking:

X <1,000 ft; ____ 1,000 ft to 0.5 miles; ____ >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite____, Probable____, Possible X, Unlikely____.

No containment with respect to groundwater.

Approximate Depth to Groundwater: ____ <25 ft; X 25 - 100 ft; ____ >100 ft.

Other observations/notes: Water level in well at 32.3' bgs.

SAMPLERS: Tuesday, Belanger, Clark, West

[illegible]

NOTE: Estimated (E) or Measured (M) from adit, shaft, seep or springs?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes X, No____, Name(s): Iron Age Gulch

Other surface water: Yes____, No X, Name(s)/Description: _____

Waste materials within any floodplain: Yes____, No X Source ID(s): _____

Approximate Flood frequency? ____1 yr, ____10 yr, ____100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)?
150 feet

Surface water draining onto or through waste sources: Yes____, No X,
Describe: _____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation,
residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Canyon Ferry Reservoir has recreational, irrigation, agriculture,
fishery, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes____,
No X. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000____.
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures
or channel changes present): _____

SAMPLERS:

[illegible]

3 (M) PENNSYLVANIA 20 (2) POTWISZ : BOWLE

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 20+ out on plain to the north

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: X <1,000 ft; ___ 1,000 ft - 0.5 miles; ___ >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

SAMPLERS: Belanger, West

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply):____ Easily accessible - no fences,
gates, or warning signs; X Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage____; Secondary Drainage X; No Information____:

Riparian Habitat Quality - High X, Medium____, Low____

Wetlands Frontage - High X, Medium____, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes____, No X, Number____, types and locations:_____

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 1,
types and locations: Highwall above former mill location

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

- MBMG, Economic Geology and Geochemical Study of Winston Mining District, Broadwater County, Montana, Bulletin 41, Written by F.N. Earll, November 1964.
- MBMG, Mines and Mineral Deposits (Except Fuels), Broadwater County, Montana, Information Circular 7592, Written by Glenn C. Reed, April 1951.
- MBMG, Well Log Database, July 14, 1994.
- MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.
- MDSL/AMRB Files, Abandoned Mine Lands Portal Inventory Form for Custer-Hyantha, Prepared by Daphne Digirindakis, June 30, 1983.
- MDSL/AMRB Files, Montana Cultural Resource Inventory Form for Custer-Iron Age Mine Group, Prepared by GCM Services, Inc., July 1986.
- USGS, Geology and Mineral Deposits, East Flank of the Elkhorn Mountains, Broadwater County, Montana, Professional Paper 665, Author Unknown, Date Unknown.
- USGS, Topographic Map, Winston, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

**CUSTER MILLSITE
PA NO. 04-006**

Custer Millsite PA# 04-006
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/22/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
04-006-TP1	5.5	535	331	8.6 J	9.3	17.7	59.7	20100	0.04 JX	2810	13.8	507	9.2	1640 J	0.308
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	ACID BASE POTENT. v/1000t	NEUTRAL. POTENT. v/1000t	SULFUR ACID BASE POTENT. v/1000t	SULFATE %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENT. v/1000t	SULFUR ACID BASE POTENT. v/1000t
04-006-TP1	0.61	19.1	36.9	17.9	0.40	0.16	0.05	5.00	31.9

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CAL.C. (mg CaCO3/L)
04-006-GW1	0.12 U	1.1 U	17.1	2.6 U	8.7 U	4.7 JX	4.6 U	9.4 U	0.11 U	53.2	8.0 U	2.8	29.4 U	5.13	91.8

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-006-GW1	227	9.2	112	<0.05	<0.005

LEGEND

TP1 - Composite of subsamples TP1A and 1B.
BACKGROUND - From the Kierstead Mill (04-010-SS1).

GW1 - Downgradient (southeast) of tailings WB-16 monitoring well.

XRF ANALYSIS RESULTS

**CUSTER MILLSITE
PA NO. 04-006**

Mine Name: Custer Millsite PA# 04-006
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
04-006-TP1A		20825.2	16401.7	1435.12		10476.2	22600.6				3309.85	425.119	229.179
04-006-TP1B		22091.5	22489.5	1506.84		2611.59				82.9284 *	1129.99	1599.2	428.754
04-006-TP1C		18737.2	37404.4	2285.22		1674.63 *	36992.3				273.862	138.653 *	555.202
04-006-TP1-COMP		22471.8	19880.9	1537.08		7859.2	25684.6			90.5271 *	2649.53	646.059	304.188
XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th	
04-006-TP1A	150.003		12.5897 *	880.882	147.419				1802.05	74.9618 *		15.5901 *	
04-006-TP1B	154.973		29.9894 *	362.962	135.172				418.111				
04-006-TP1C	256.647				95.439				647.196			14.1801 *	
04-006-TP1-COMP	162.708		12.2059 *	675.303	129.147				1494.34				

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**CUSTER MILLSITE
PA NO. 04-006**

AIMSS SCORESHEET

SITE NAME:

Custer Millsite

PA NUMBER:

04-006

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	10
3B	OF RELEASE	GW DEPTH	10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	30.0
7	GW - TARGETS	WELLS - 1 TO 4 MI	88
8		NEAREST WELL	10
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
			145472
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD	EXCEEDENCES	0
13A	OF RELEASE	CONTAINMENT	10
13B		DISTANCE TO SW	2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	10
19	SW - TARGETS	FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
			4333
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	10
31	AIR - TARGETS	WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
			600
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	0
37A	LIKELIHOOD OF	ACCESSIBILITY	10
37B	EXPOSURE	DISTANCE TO POPULATION	20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	1
41	TARGETS	NEAREST RESIDENCE	10
42		RECREATIONAL USE	0
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
			251
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		1.51
	(LINES 10 + 24 + 35 + 44) / 100,000		

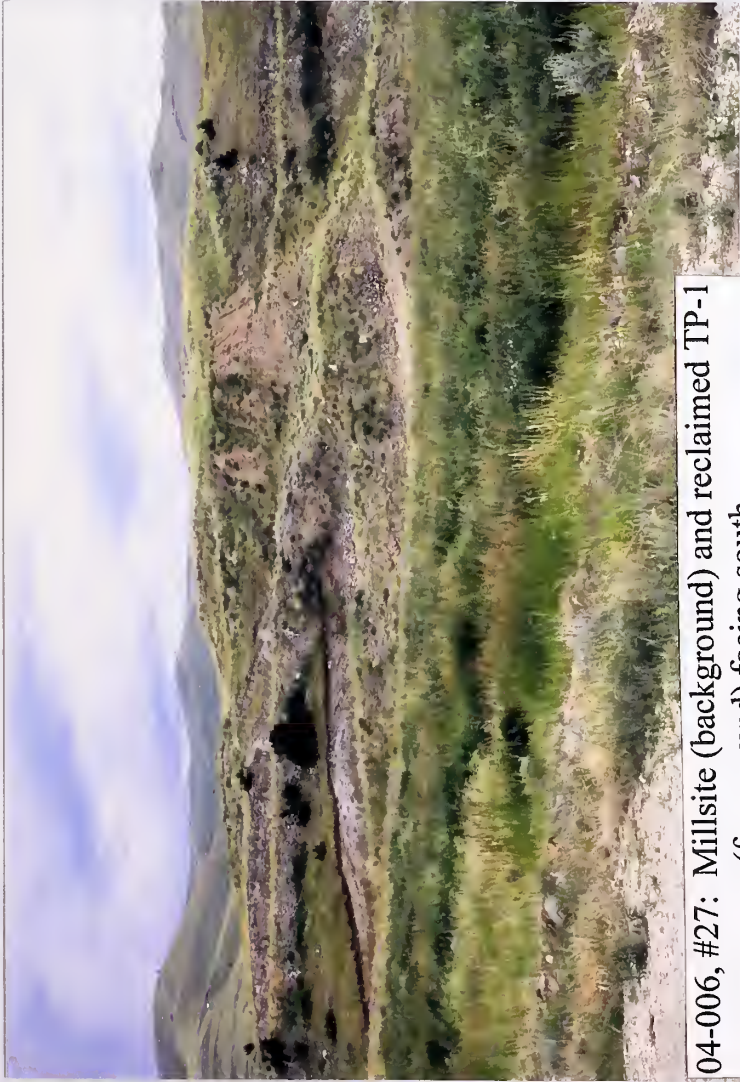
SITE NAME:
PA NUMBER:

Custer Millsite
04-006

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	75
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	11
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	8.25



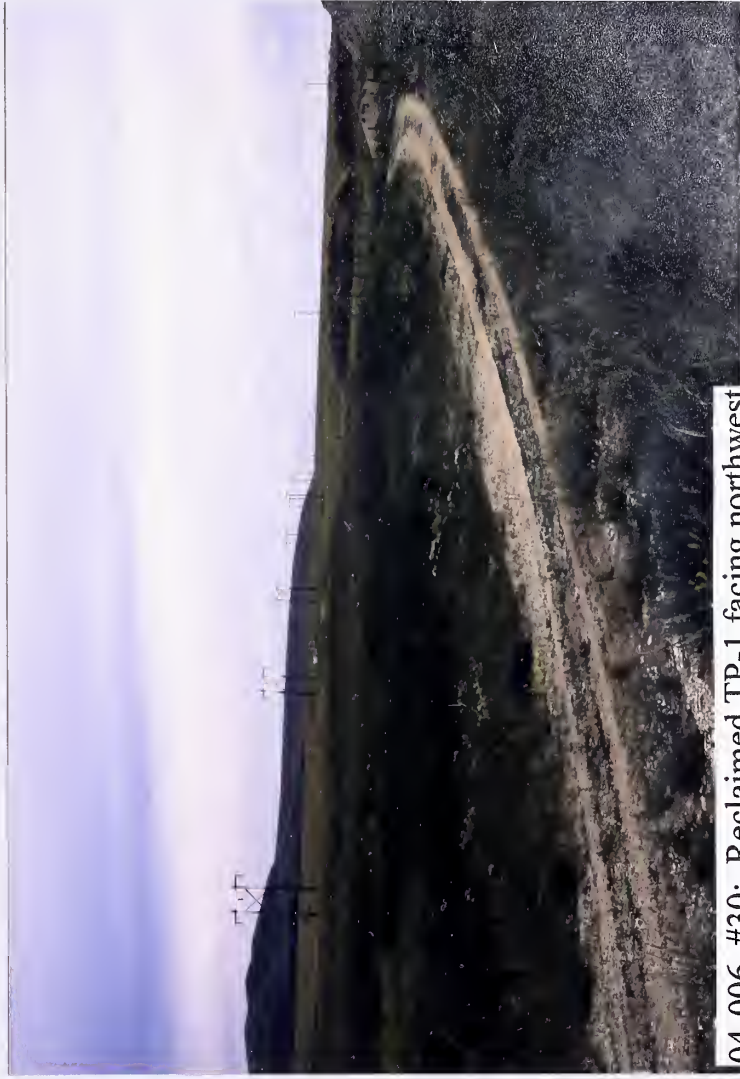
04-006, #27: Millsite (background) and reclaimed TP-1
(foreground) facing south



04-006, #28: Middle millsite and reclaimed TP-1 facing
southwest



04-006, #29: Old buildings and reclaimed TP-1
(foreground) facing west



04-006, #30: Reclaimed TP-1 facing northwest



04-006, #31: GW-1 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: KLEINSCHMIDT PA#: 04-010

Date: July 21, 1994 Time: 1450-2015

Field Team Leader: Flammang, Pioneer

Sampling Personnel: Clark, West; Pioneer

Visitors: Person with overheated truck

Weather/Seasonality Observations: Hot (90°); sunny; slight breeze;
very dry.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #21: WR-1C on left
and WR-1B on right, looking west; #22: WR-2, looking east.
Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): A small, active logging operation was observed immediately east and
adjacent to WR-3. A larger, active logging operation was observed
southwest of mine on hillside across from Whitehorse Creek. Cattle
were grazing on waste rock and drinking water from stream where it
flows through waste rock.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Isolate WR-4
(tailings) from Whitehorse Creek and shallow alluvial groundwater
by removing from floodplain. Contour, amend, and revegetate WR-1,
WR-2, WR-3, and WR-4.

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I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): KLEINSCHMIDT PA#: 04-010

Legal Description: T 7N ; R 1W ; Sec. 3 , SW 1/4 NE 1/4 1/4

County: BROADWATER Mining District: WINSTON

Latitude: N 46° 23' 25" Longitude: W 111° 42' 45"

Primary Drainage Basin and Code: Missouri River/10030101

Secondary Drainage Basin: Whitehorse Creek

USGS Quadrangle map name(s): Winston

Mine Type/Commodities: Hardrock/Gold, Lead, Zinc, Silver

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district: It appears from literature that Adit #1 on the Golden Age property (PA #04-050) was driven for access to a vein on Kleinschmidt property.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 7200'-7600', Slope 15° ,
Aspect Southeast

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 6.5 acre(s) .

Site Dimensions: 300 feet x 300 feet (WR-1); 200 feet x 275 feet (WR-2); 400 feet x 200 feet (WR-3); 500 feet x 100 feet (WR-4)

Predominant vegetation types: Lodgepole pine, Douglas fir, meadow grasses

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites). Near Vosburg and Golden Age mines

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by quartz monzonite. The site lies on the north side of Whitehorse Creek. Whitehorse Creek flows east away from the site. Water in Whitehorse Creek would eventually flow into Canyon Ferry Reservoir on the Missouri River 7.5 miles east of the mine, but the flow appears to dissipate before it reaches the reservoir.

Mining/milling history, ore type/tenor, host rock, gangue: Mine was originally known as the Little Olga and operated prior to the 1900s for gold. Primary production occurred from 1910 to 1927. Production from 1901 to 1948 inclusive was reported at 4,354 tons of ore averaging 0.047 oz. gold, 18.7 oz. silver and 6.7% lead. Mine was abandoned in 1949. Ore produced in 1948 contained 6.7% zinc. Vein mineralization with auriferous pyrite, argentiferous galena, sphalerite, auriferous chalcopyrite, arsenopyrite, and tetrahedrite in a gangue of quartz, siderite, altered rock and gouge.

Mine Operation?

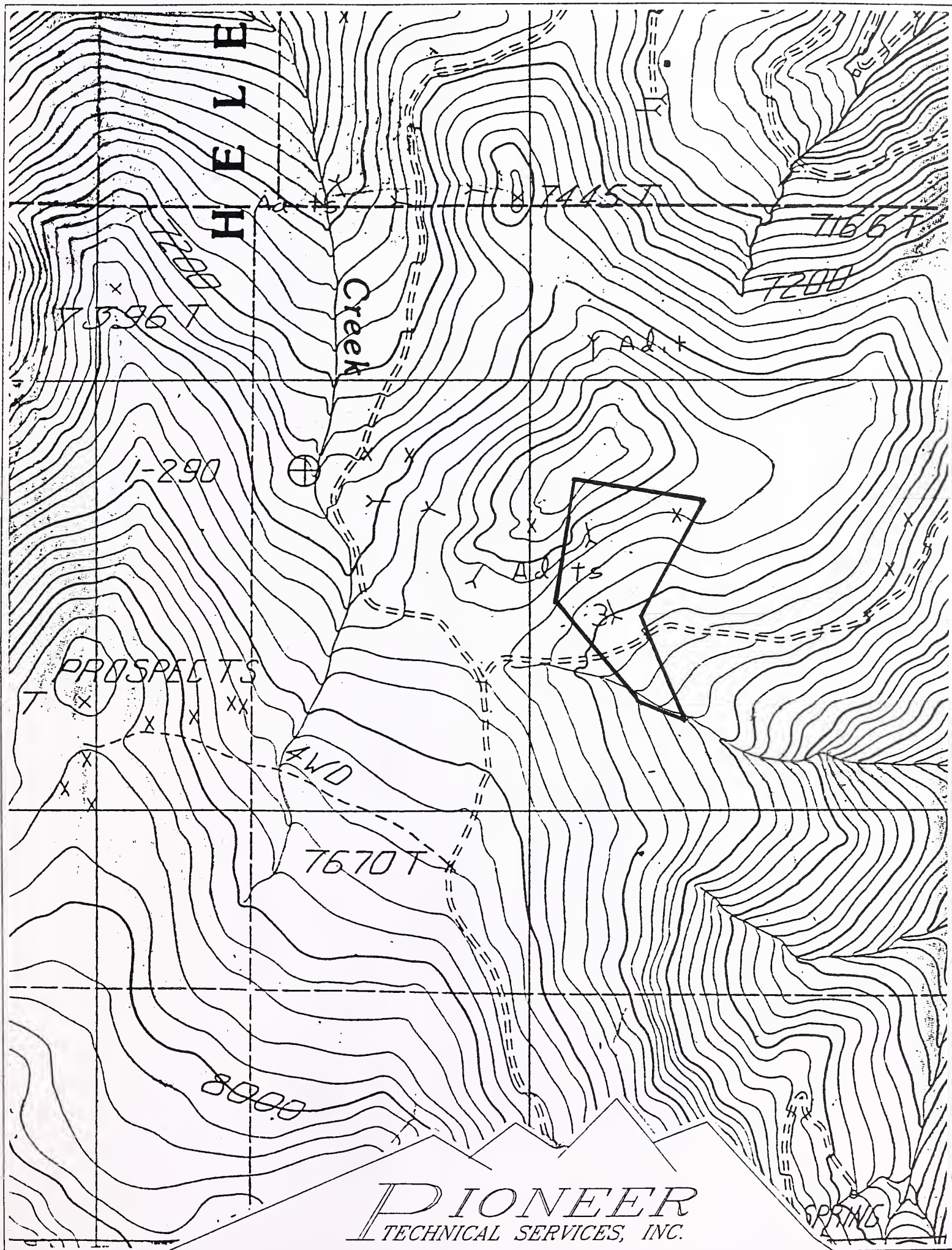
Shafts - Yes , No X, # , Comment
Adits - Yes X, No , # 6, Comment Caved w/assoc. trenches
Pits - Yes X, No , # Many, Comment 1 on WR-1A, 10'x15'x10'
Placers - Yes , No X, # , Comment
Other - Yes , No X, # , Comment

Mill Operation? Yes X, No . If yes answer the next three questions:

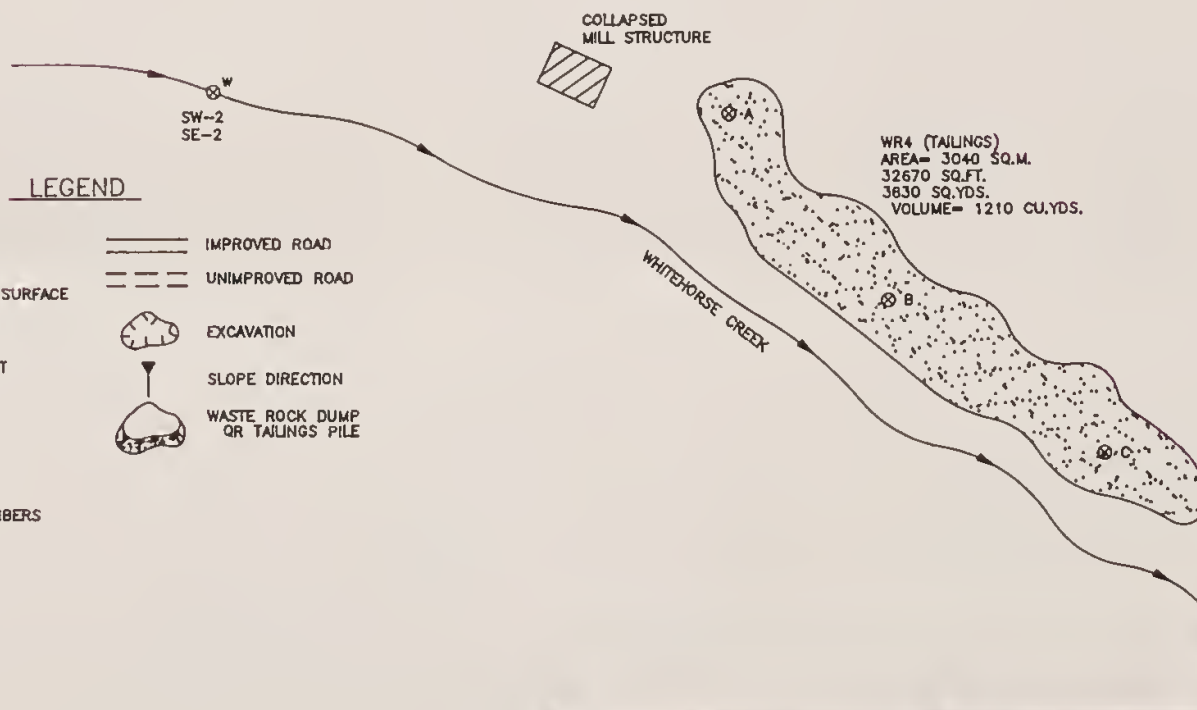
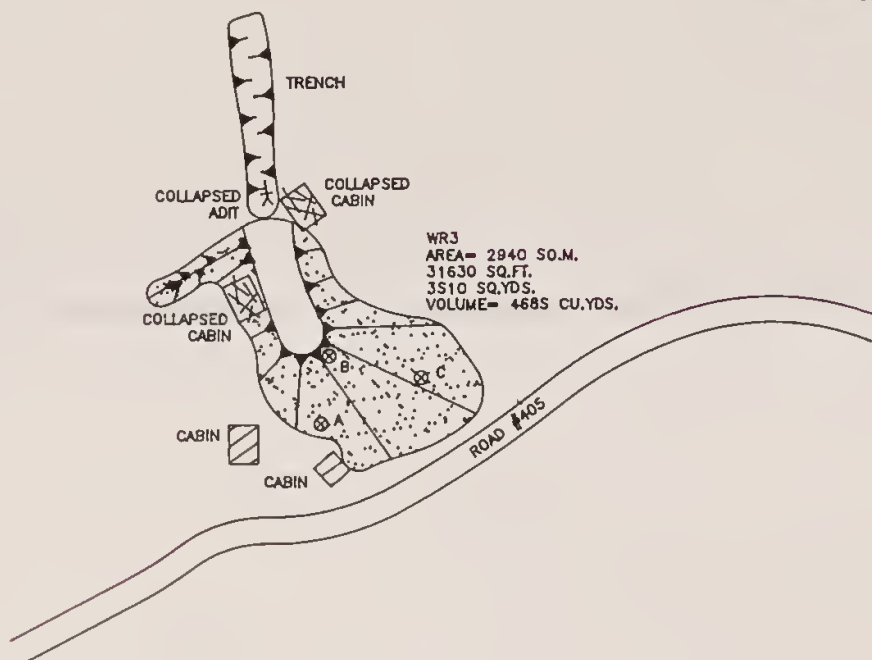
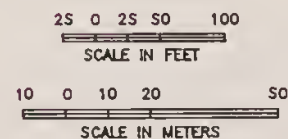
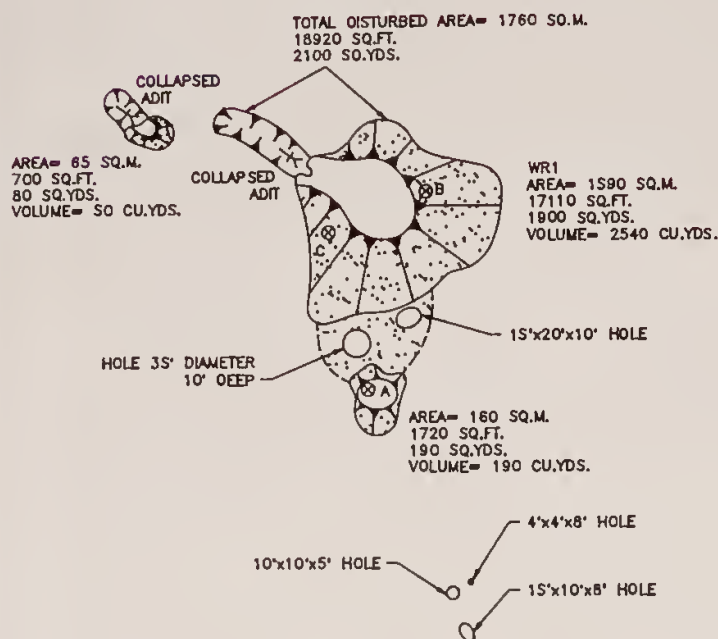
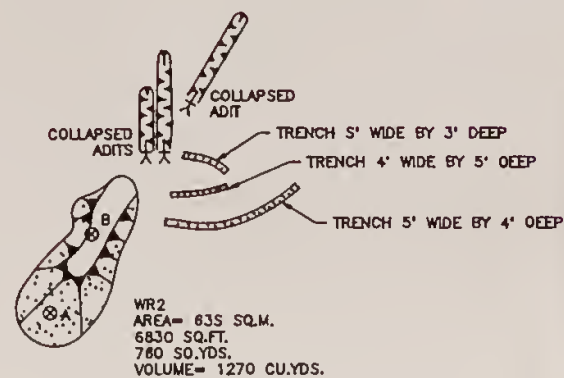
Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Unknown



KLEINSCHMIDT, P.A. NO. 04-010
T07N, R01W, SECTION 03
SCALE: 1" = 1000'



LEGEND

- ⊗ XRF SAMPLE
- ⊗^w WATER SAMPLE GROUND AND SURFACE
- OPEN ADIT
- ✕ COLLAPSED ADIT
- DRAINAGE
- DRY DRAINAGE
- ▨ STRUCTURE
- ✕ COLLAPSED TIMBERS
- == IMPROVED ROAD
- UNIMPROVED ROAD
- ⬮ EXCAVATION
- ⬮ SLOPE DIRECTION
- ⬮ WASTE ROCK DUMP OR TAILINGS PILE

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

KLEINSCHMIDT
PA# 04-010

DRAWING NO.: PT340219
DATE: 12/12/94

REV: --
PLOT SCALE: 1 = 40

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 40% clayey sand, 20% silt, 40% clayey silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): No impoundment; depth ranged from 24" on west end to 6" at east end. In all holes, top layer varied from dark orange clayey sand to pinkish orange silt; all had yellow clayey silt near bottom.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): None

Comments on potential for mitigation: All large trees on tailings are dead; little vegetation on streambank where tailings are located. Tailings have eroded at least 400' downstream. Collect all tailings; isolate from stream; cap; topsoil and revegetate.

SOURCE INVENTORY FORM

SAMPLERS: Flammang, West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (MR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	190	Northwest part of site on south end of lower level; east face off knob	None	6.2 (D)	0.04	04-010-WR-1	07/22/94 0750	T-Metals, ABA
WR-1B	WR	2,540	Northwest part of site, upper level; northwest corner on east face at top	None	5.6 (D)	0.06			
WR-1C	WR		Northwest part of site, east end of upper level; southeast face, just off top	None	< 3.5 (D)	0.04			
WR-2A	WR	1,270	Northeast part of site; south end off knob approx. 10'	None	5.6 (D)	0.06			
WR-2B	WR		Northeast part of site; north end, west side, just off top	None	4.25 (D)	0.05			
WR-3A	WR	4,685	North of main road; west lobe, south end, just off knob	None	< 3.5 (D)	0.05	04-010-WR-2	07/22/94 0755	T-Metals, ABA
WR-3B	WR		North of main road; middle lobe, east side of gully in light yellow material	None	< 3.5 (D)	0.03			
WR-3C	WR		North of main road; east lobe, south end of top	None	< 3.5 (D)	0.03			
WR-4A-A	TAIL	1,210	Tailings south of main road; east end, 0-24"	None	4.5 (D)	0.03	04-010-WR-3	07/22/94 0755	T-Metals, ABA
WR-4A-B	SOIL		Tailings south of main road; east end, 24-30", underlying soil	None	6.0 (D)	0.025	N/A	N/A	XRF Analysis
WR-4B	TAIL		Tailings south of main road; near center of pile, 0-5"	None	5.6 (D)	0.03			
WR-4C	TAIL		Tailings south of main road; approx. 120' up from first live, large tree, 0-6"	None	6.0 (D)	0.03			
SS-1	SOIL	N/A	Background soil on ridge northwest of WR-2	N/A	N/A	N/A	04-010-SS-1	07/21/94 1800	T-Metals

D-Direct Seeding (Relay Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 04-010-WR-1 is composite of WR-1A through -1C, and WR-2A and -2B. 04-010-WR-2 is composite of WR-3A through -3C. 04-010-WR-3 is composite of WR-4A-A, WR-4B and -4C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:_____

Filled shafts: Yes___, No X, Number:___ Identification:_____

Seeps/Springs: Yes X, No___, Number: 2+ Identification: Whitehorse Creek begins as a spring just upgradient of the site; several springs feed it in the vicinity of this site.

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 3

Distance to nearest well used for drinking:

___<1,000 ft; ___1,000 ft to 0.5 miles; X>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible X, Unlikely___.

Large uncontained source containing elevated metal values. WR-3 and WR 4 in particular are probably very near shallow alluvial aquifer.

Approximate Depth to Groundwater: X<25 ft; ___ 25 - 100 ft; ___ >100 ft.

Other observations/notes: N/A

SAMPLERS:

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes ☒, No ☐, Name(s): Whitehorse Creek

Dry streambeds: Yes ☐, No ☒, Name(s): _____

Other surface water: Yes ☐, No ☒, Name(s)/Description: _____

Waste materials within any floodplain: Yes ☒, No ☐ Source ID(s): Waste from WR-4 is present on both sides of Whitehorse Creek.

Approximate Flood frequency? ☒ 1 yr, ☐ 10 yr, ☐ 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 25 gpm

High Flow: 0.5 cfs, Average Flow: 25 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between Whitehorse Creek and WR-4; 75 feet between nearest spring and WR-3.

Surface water draining onto or through waste sources: Yes ☒, No ☐, Describe: Waste from WR-4 is present on both sides of creek, indicating creek may be flowing through waste materials.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Agriculture, USFS Wildlife Management Area; Whitehorse Creek flows into Canyon Ferry Reservoir, which has irrigation, agriculture, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes ☒, No ☐. Distance downstream (ft)? 0-500 ☐; 500-1,000 ☐; >1,000 ☒. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): WR-1 has fines eroding off of it for at least 200 feet below the dump onto forest floor. Tailings from WR-4 appear to be affecting vegetation for at least 400 feet downgradient of pile; small piles of sediment from WR-4 are present from 400 to 800 feet and are piled up behind trees. Sediment samples 1,000 feet downstream of SW-1 show elevated arsenic, zinc, and lead concentrations. Cattle have impacted Whitehorse Creek in the vicinity of WR-4 and are also contributing to turbidity and erosion.

SURFACE WATER INVENTORY FORM

SAMPLERS: Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH	SC μS/cm 25°C	Temp °C	ALK. mg/L as CaCO ₃	Flow cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Approx. 80' downgradient of WR-4 after last bunch of large dead trees	6.4	130	19.6	28	25 gpm (E)	04-010-SW-1	07/21/94 1820	T-Metals, TDS, Hardness, Cl, SO ₄ , NO ₂ /NO ₃
SE-1	SE	Approx. 80' downgradient of WR-4 after last bunch of large dead trees	N/A	N/A	N/A	N/A	N/A	04-010-SE-1	07/21/94 1820	T-Metals
SW-2	SW	20' downgradient of spring that starts Whitehorse Creek; 150' south of WR-3	7.37	79	11.9	32	25 gpm (E)	04-010-SW-2	07/21/94 1840	T-Metals, TDS, Hardness, Cl, SO ₄ , NO ₂ /NO ₃
SE-2	SE	20' downgradient of spring that starts Whitehorse Creek; 150' south of WR-3	N/A	N/A	N/A	N/A	N/A	04-010-SE-2	07/21/94 1840	T-Metals
SE-500	SE	Approx. 500' below SW-1; tailings still present	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis
SE-1000	SE	Approx. 1,000' below SW-1; tailings still present	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M) ?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO ₃)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 10 acres in the WR-3 and WR-4 areas are relatively flat.

Wetlands present: Yes X, No , Describe: Small wetlands associated with springs

Carbonate rocks/soils: Yes____, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: <1,000 ft; 1,000 ft - 0.5 miles; X >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:

observed	high	moderate	low	none
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ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flamang, Clark, West

SOURCE I. D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FeOx; SO3; pH	Dry	18,920	18,920	Yes	Low
WR-2	FeOx; SO3; pH	Dry	6,830	6,830	Yes	None
WR-3	FeOx; SO3; pH	Dry	31,630	31,630	Yes	Low
WR-4	FeOx; SO3; pH; VEG; ESD	Dry	32,670	31,037	Yes	Low/Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe: Loggers temporarily present

Population within 1 mile: 1-10____; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments None

Evidence of recreational use on site: Yes X, No____, Describe: Gun shell casings; beer cans

Accessibility (check each that apply): X Easily accessible - no fences, gates, or warning signs;____ Moderately Accessible - barbed wire fences, road gated, or signs posted;____ Difficult Access - chain-link fence, road gated and locked, site guarded (does not include locked or manned access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment____
Wilderness Area - Yes____, No X, Comment____
T&E Species Habitat - Yes____, No X, Comment____
Bat Habitat - Yes____, No X, Comment____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium X, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:____

Hazardous structures: Yes X, No____, Number 4, types and locations: 3 collapsing cabins near WR-3; 1 either small mill or large loadout just east of WR-4

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 1+, types and locations: 10' pit on WR-1; many smaller pits 3-5' deep. All adits have collapsed trenches; 150' long by 5-6' deep by Adit #3.

Unstable waste piles, impoundments, undercut banks: Yes X, No____, Number 2, types and locations: WR-1 and WR-2 piles are steep, unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes____, No X, Explain:____

Bibliography

MBMG, Economic Geology and Geochemical Study of Winston Mining District, Broadwater County, Montana, Bulletin 41, Written by F.N. Earll, November 1964.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Kleinschmidt, Prepared by Tierra Buena Contracting, December 20, 1982.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Kleinschmidt, Prepared by Northern Engineering and Testing, May 23, 1988.

USGS, Topographic Map, Winston, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

**KLEINSCHMIDT
PA NO. 04-010**

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
04-010-SE1	49.3	3960	119	5.8	3.0	4.0 JX	147 JX	39200	0.19 J	2510	4.0 UJX	4790	27.3 J	776 JX	NR
04-010-SE2	1.1 U	26.5	34.7	1.0 U	2.1 U	2.1 JX	14.2 JX	6500	0.03 J	191	4.3 JX	42.4	12.6 UJ	222 JX	NR
04-010-WR1	28.5	1760	57.3	2.9	1.7	1.7 JX	88.2 JX	30600	0.75 J	1570	2.3 UJX	5070	8.2 UJ	421 JX	NR
04-010-WR2	61.2	4180	58.2	2.9	2.5	1.3 UJX	123 JX	53100	0.18 J	1400	2.8 UJX	6840	10.2 UJ	534 JX	NR
04-010-WR3	111.0	8030	68.3	8.8	1.7 U	2.7 JX	335 JX	67100	0.66 J	3030	3.0 UJX	12100	56.9 J	1480 JX	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR		SULFUR ACID BASE	
	%	V/1000t	%	V/1000t	%	V/1000t	%	V/1000t	%	V/1000t	%	V/1000t	POTENT.	V/1000t
04-010-WR1	1.32	41.2	1.44	-40	1.13	-121	0.01	0.31	0.18	0.31	0.01	0.18	1.13	-25.9
04-010-WR2	3.60	112	-9.03	-121	2.01	-121	0.54	16.9	1.05	16.9	0.54	1.05	-25.9	-25.9

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-010-SW1	3.1	88.7 J	24.1	4.0 U	8.4 U	6.8 U	19.2	3740	0.16	314	14.4 U	122 J	51.6 U	114	37.3
04-010-SW2	0.12 U	7.5 J	5.5 U	4.0 U	8.4 U	6.8 U	5.9 U	316	0.14	37.9	14.4 U	3.9 J	51.6 U	25.1	29.6

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-010-SW1	59	<5	5	0.11	NR
04-010-SW2	59	<5	<5	0.21	NR

LEGEND

SE1 - Approx. 80' downgradient of WR4 after last bunch of large dead trees.
SE2 - 20' downgradient of spring that starts White Horse Creek; 150' south of WR3.
WR1 - Composite of subsamples WR1A through 1C, and 2A and 2B.
WR2 - Composite of subsamples WR2A through 3C.
WR3 - Composite of subsamples WR3A, 4B, and 4C.
BACKGROUND - From the Kleinschmidt Mine (04-010-SS1).

SW1 - Same as sample 04-010-SE1.
SW2 - Same as sample 04-010-SE2.

XRF ANALYSIS RESULTS

**KLEINSCHMIDT
PA NO. 04-010**

Site Name: Kleinschmidt PA# 04-010
XRF Field Analysis
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
04-010-SE1000		10898.6	8144.6	934.265		3665.55	37432	521.629 *	158.944 *	833.318	3492.56	268.854
04-010-SE500		11653.4	9182.36	1167.37		3056.84	36152.4		156.22 *	682.25	3069.41	243.317
04-010-WR1A		24670	25465.2	231.337 *		14947.6	38109		106.677 *	243.364 *	1324.84	148.187
04-010-WR1B		29978.7	3799.81	728.972		3218.03	50731.8		190.815 *	356.518	4892.21	296.032
04-010-WR1C		38594.4	2126.92	585.786 *			37948		170.006 *	1039.21	959.212 *	
04-010-WR1-COMP		29594.4	12362.3	397.114 *	315.727 *	3483.23	47825.8		154.833 *	397.516	1959.48	327.104
04-010-WR2A		36935	14028.9	332.219 *		2478.05	58746.8		284.379 *	440.684	3656.96	491.787
04-010-WR2B		29387.4	6735.77	561.146 *		2937.26	63875.6		144.342 *	234.235 *	1773.29	558.196
04-010-WR2-COMP		24917.7	11508.7	943.066	272.242 *	3338.28	59761.3		139.779 *	579.496	4656.52	209.809
04-010-WR3A		15604.2	15715.4	1836.6		3623.09	69465.1		100.633 *	746.161	6428.15	550.107
04-010-WR3B		33118.1	5638.55	612.236			38290		170.431 *	335.31	1169.51	19.3791 *
04-010-WR3C		24306	5559.16	309.274 *		3771.64	65823		109.979 *	381.667	4901.83	
04-010-WR3-COMP		22184.9	3042.75	342.104 *	216.358 *	5034.01	56363	888.466 *	259.543 *	977.543	6100.25	39.6902 *
04-010-WR4AA		18407.9	2849.53	615.349		6565.22	66725.6		444.688	1749.38	6138.01	118.063
04-010-WR4AB		9240.29	6116.92	1513.87		7973.61	29156.8		649.919	2605.41	358.842	219.672
04-010-WR4B		22967.2	1998.76	441.362 *		559.199 *	55140.8		227.028 *	627.604	6291.55	37.4907 *
04-010-WR4C		18370.7	1751.63	309.614 *	217.385 *	554.979 *	60790.7		241.903 *	540.189	7240.4	49.6745 *
04-010-WR4C-DUP		18100.8	1906.55	346.26 *	293.805 *	802.424 *	61550.7		243.339 *	531.833	7392.35	43.6556 *
XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th	
04-010-SE1000	98.1281		11.5634 *	2683.55	82.0543 *		60.9506 *	283.191				
04-010-SE500	132.734		13.0844 *	2911.19	73.5212 *			220.224				
04-010-WR1A	129.793		37.4156	210.001	151.282			349.302				
04-010-WR1B	158.52		103.155	1459.92	196.786			742.308			21.5937 *	
04-010-WR1C	132.867			7367.34	168.748			97.1626 *	101.377 *			
04-010-WR1-COMP	131.592		110.836	2401.84	163.8			554.356			46.0345 *	
04-010-WR2A	126.833		187.234	2207.11	218.243			1103.92				
04-010-WR2B	145.209		209.853	1585.55	194.757			935.852			21.8351 *	
04-010-WR2-COMP	131.623		25.9211 *	2834.54	141.221			215.839			32.2669 *	
04-010-WR3A	111.5		28.3177 *	93.8135 *	97.7219			605.468				
04-010-WR3B	108.463		23.5598 *	6373.51	153.602			84.1551 *	163.802 *		32.7134 *	
04-010-WR3C	85.7154		11.2893 *	1100.08	105.892			69.9789 *				
04-010-WR3-COMP	97.7866	169.426 *	28.3601 *	7795.94	156.895			95.8983 *			95.6867 *	
04-010-WR4AA	112.516		21.0757 *	9009	120.208			324.079	113.577 *			
04-010-WR4AB	116.312			145.248 *	80.2979			390.746				
04-010-WR4B	135.742		25.5959 *	10501.9	121.46			129.504 *	192.025 *			
04-010-WR4C	86.307		25.9606 *	5262.47	115.749			118.529 *	92.9458 *			
04-010-WR4C-DUP	93.4872		20.0241 *	5359.85	117.336			101.496 *	136.793 *			

* - Estimated Quantity

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**KLEINSCHMIDT
PA NO. 04-010**

AIMSS SCORESHEET

SITE NAME:

Kleinschmidt

PA NUMBER:

04-010

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 72.863
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	3
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 3.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 87436
SURFACE WATER PATHWAY			
11		OBSERVED RELEASE	300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES	100
13A		CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 78.187
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	1
18		WETLANDS	10
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 19
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 1188442
AIR PATHWAY			
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	5
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 25
27		LIKELIHOOD SCORE	LINES 25 + 26C 25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 4.035
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31		WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 40
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 4035
DIRECT CONTACT PATHWAY			
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	20
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 100
38		LIKELIHOOD SCORE	LINES 36 + 37C 150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 3.766
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	0
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	5
43		TARGETS SCORE	SUM LINES 40 THRU 42 5
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 2825
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000		12.83

SITE NAME:
PA NUMBER:

Kleinschmidt
04-010

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	235
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	23.50



04-010, #21: WR-1C (left) and WR-1B (right) facing west



04-010, #22: WR-2 facing east

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GOLDEN AGE PA#: 04-050

Legal Description: T 8N ; R 1W ; Sec. 34 , SW 1/4 SE 1/4 1/4

County: BROADWATER Mining District: WINSTON

Latitude: N 46° 24' 05" Longitude: W 111° 42' 42"

Primary Drainage Basin and Code: Beaver Creek/10030101

Secondary Drainage Basin: Weasel Creek

USGS Quadrangle map name(s): Winston

Mine Type/Commodities: Hardrock/Gold, Lead, Zinc, Silver

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private/Public

Owner, Agent, or Contact (Include address and phone when available): Unknown; USFS

Relationship to other mines/sites in the area/district: Literature reports Adit #1 was driven 3,300' to intersect the vein on the Kleinschmidt property. Similar mineralization as at the Vosburg Mine.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? HMO closure with cable net.

General site features: Elevation 6720'-7000', Slope 15°-25°,
Aspect East and Northeast

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 3 acre(s).

Site Dimensions: 250 feet x 200 feet (upper); 300 feet x 250 feet (lower)

Predominant vegetation types: Douglas fir, lupine, stinging nettles, raspberries

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites). Near Vosburg and Kleinschmidt mines.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There is 1
well reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also
note presence of radioactive minerals). Site is underlain by quartz monzonite of
Little Olga Stock. Adit #1 and WR-1 lie in the headwaters of
Weasel Creek, which flows northeast away from the site; confluence
3.5 miles north of site with Beaver Creek, which then flows
northeast. Beaver Creek flows into irrigation ditches 2 miles
northeast; any water remaining in Beaver Creek flows into Canyon
Ferry Reservoir on the Missouri River approximately 11 miles below
the mine site.

Mining/milling history, ore type/tenor, host rock, gangue: Vein
mineralization with auriferous pyrite, argentiferous galena,
sphalerite, auriferous chalcopyrite, arsenopyrite, and
tetrahedrite in a gangue of quartz, siderite, altered rock, and
gouge. Adit #1, known as Carlson Crosscut, extends 3,300' to reach
the Little Olga vein on the Kleinschmidt property.

Mine Operation?

Shafts - Yes , No X, # , Comment

Adits - Yes X, No , # 6, Comment 4 caved, 2 discharging;
1 closed with cable net,
discharging; 1 open

Pits - Yes X, No , # 1, Comment Large pit above collapsed
trench assoc. with Adit #1

Placers - Yes , No X, # , Comment

Other - Yes , No X, # , Comment

Mill Operation? Yes , No X. If yes answer the next three
questions:

Period(s) of Operation: N/A

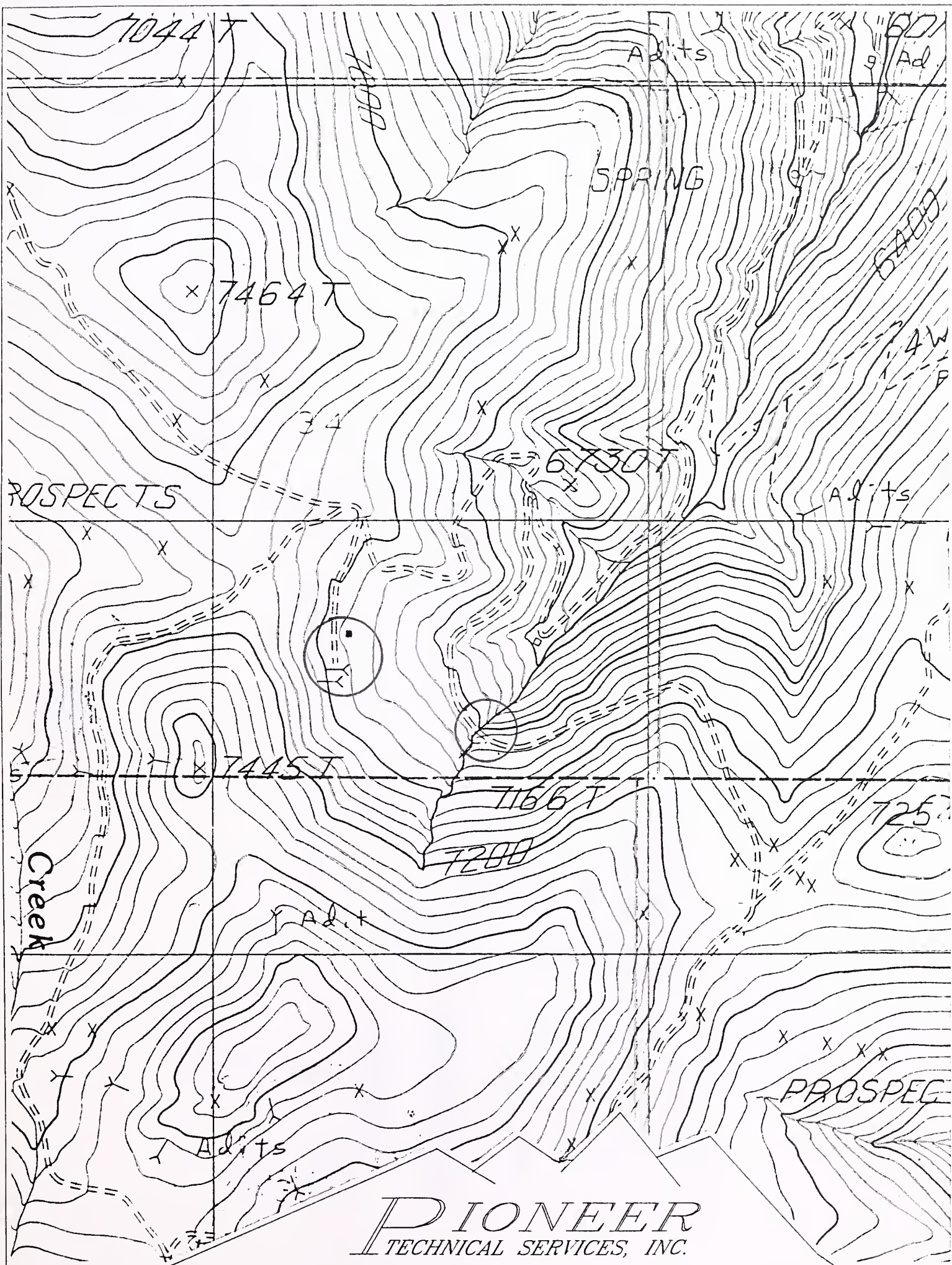
Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and
names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

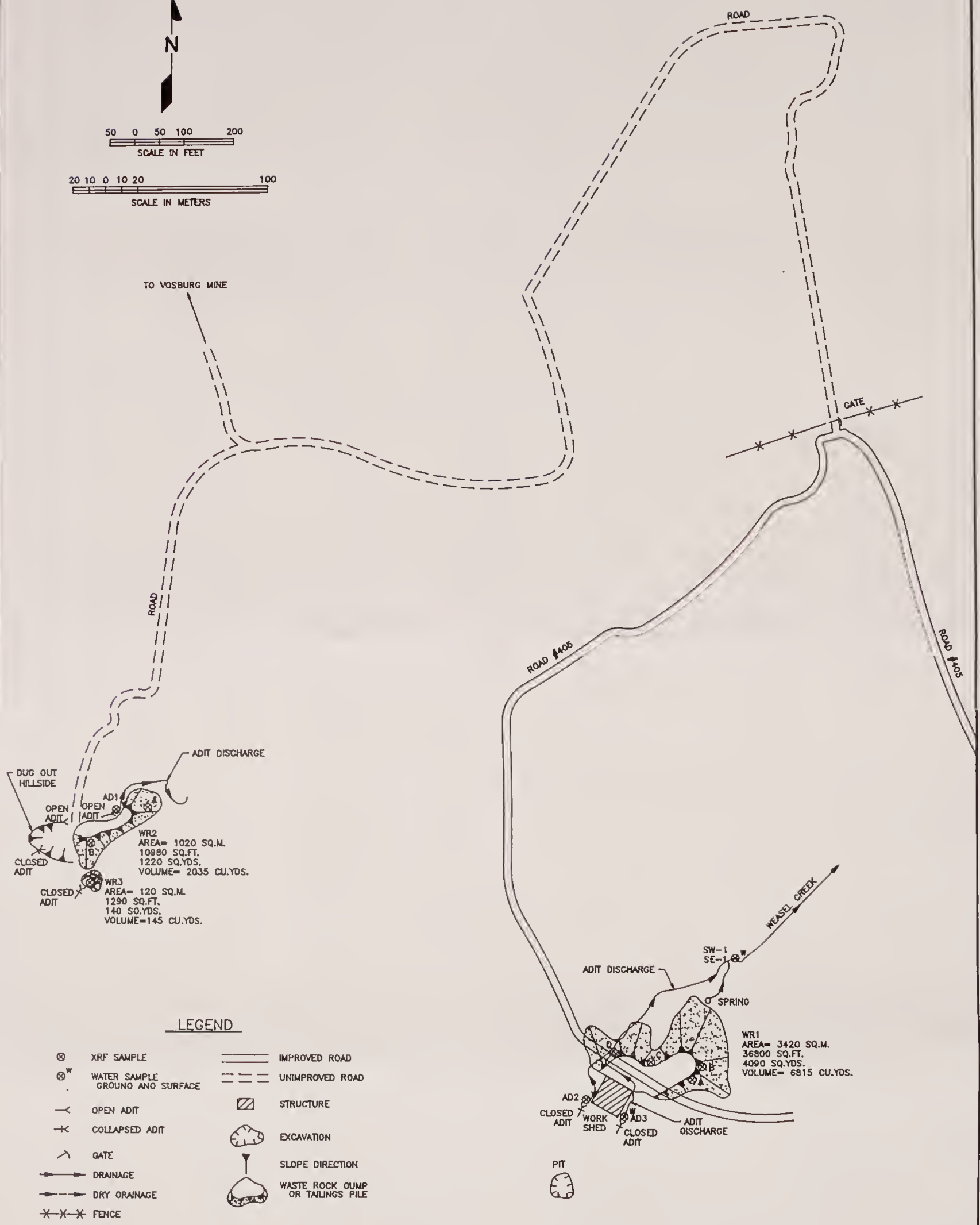
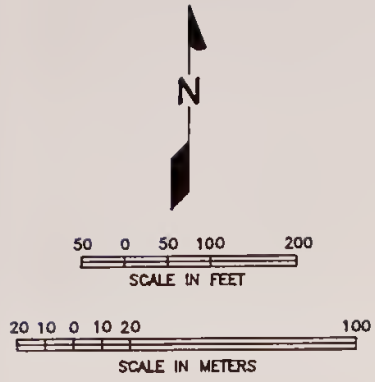
Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

Well No.	Location	Depth	Yield	Static Water Level
57138	08N 01W 28 D	101.0	30.0	40.00



GOLDEN AGE, P.A. NO. 04-050
T08N, R01W, SECTION 34
SCALE: 1" = 1000'



LEGEND

- | | | | |
|----------------|---------------------------------|-------|----------------------------------|
| ⊗ | XRF SAMPLE | ===== | IMPROVED ROAD |
| ⊗ ^W | WATER SAMPLE GROUND AND SURFACE | ----- | UNIMPROVED ROAD |
| — | OPEN ADIT | ▨ | STRUCTURE |
| —X— | COLLAPSED ADIT | ⬮ | EXCAVATION |
| ⌒ | GATE | ⬮ | SLOPE DIRECTION |
| → | DRAINAGE | ⬮ | WASTE ROCK OUMP OR TAILINGS FILE |
| → | DRY DRAINAGE | | |
| —X—X—X— | FENCE | | |

DRAWN FOR:



TITLE:

GOLDEN AGE
PA# 04-050

DRAWING NO.: PTJ40220
DATE: 11/15/94

REV: —
PLOT SCALE: 1 = 60

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	6,815	East end of lower waste rock; on top, in medium gray material	None	< 3.5 (D)	0.05	04-050-WR-1	07/22/94 0745	T-Metals, ABA
WR-1B	WR		West of WR-1A in yellow material	None	< 3.5 (D)	0.04			
WR-1C	WR		Lower waste rock; below east corner of metal building in gray material	None	< 3.5 (D)	0.05			
WR-1D	WR		Near west side of building, 20' down on gray/yellow material	None	3.7 (D)	0.04			
WR-2A	WR	2,035	Upper site, lowest waste rock pile; near center, 1/2 way down	None	6.4 (D)	0.04	04-050-WR-2	07/22/94 0745	T-Metals, ABA
WR-2B	WR		Upper site, north waste rock pile; off east end, near middle	None	5.8 (D)	0.05			
WR-3	WR	145	Upper site, south waste rock pile; off east end, near top	None	6.7 (D)	0.06	N/A	N/A	XRF Analysis

D-Direct reading (dryway Meter); S-Saturated Paste (Oxion Meter)

Comments or deviations from SOPs: 04-050-WR-1 is composite of WR-1A through -1D. 04-050-WR-2 is composite of WR-2A and -2B. See Kleinschmidt (04-010) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 3 Identification: Adit #1, Adit #2A, and adit just east of Adit #1

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes X, No , Number: 1 Identification: Seep at toe (northeast corner) of WR-1

Groundwater wells within 4 miles?: Yes X, No ;

Number of well logs: 14

Distance to nearest well used for drinking:

 <1,000 ft; 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Water appears to flow through large uncontained source (WR-1) with elevated metal values. Groundwater in adits is in contact with metals.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: N/A

SAMPLERS: Clark

Flow: Estimated (E) or Measured (M) from edit, shaft, seep or spring?

MDSL AMRB/PIONEER 5/16/94

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Weasel Creek

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes , No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No Source ID(s):
Weasel Creek headwaters start with discharge from Adit #1 and flow over
WR-1.

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 0.1 cfs
High Flow: 0.5 cfs, Average Flow: 0.1 cfs

Distance between waste source(s) and nearest surface water body (ft)?
0 feet - WR-1; 0 feet - WR-2A

Surface water draining onto or through waste sources: Yes X, No ,
Describe: Discharge from Adit #1 and adit east of Adit #1 flow over WR-
1. Discharge from below WR-1 flows into Weasel Creek. Discharge from
Adit #2A flows over part of WR-2A.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation,
residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, irrigation, recreation, wetland, fishery, USFS Wildlife
Management Area; Canyon Ferry Reservoir is Bald Eagle habitat.

Observed erosional/sedimentation/stream turbidity problems? Yes X,
No . Distance downstream (ft)? 0-500 X; 500-1,000 ; >1,000 .
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures
or channel changes present): At 500 feet, 2 small waste rock piles in the stream
are associated with another mine. Sediment at 500 feet has elevated,
silver, zinc, and lead.

SAMPLERS: Clark

Flow: Estimated (E) or Measured (M)?

MDSL AMRB/PIONEER 5/16/94

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO ₃)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH \leq 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres below WR-2A

Wetlands present: Yes___, No X, Describe: _____

Carbonate rocks/soils: Yes___, No X, Describe: _____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: <1,000 ft; 1,000 ft - 0.5 miles; X >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:

observed	high	moderate	low	none
----------	------	----------	-----	------

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Clark, West

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (GHS)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3; pH	Dry	36,800	36,800	Yes	Low
WR-2	SO3; pH	Dry	10,980	10,431	Yes	Low
WR-3	SO3	Dry	1,290	1,032	Yes	None
AD-1	None	N/A	N/A	N/A	N/A	N/A
AD-2	None	N/A	N/A	N/A	N/A	N/A
AD-3	None	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply): X Easily accessible - no fences, gates, or warning signs;____ Moderately Accessible - barbed wire fences, road gated, or signs posted;____ Difficult Access - chain-link fence, road gated and locked, site guarded (does not include locked or manned access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes X, No____, Comment Possible, open adit

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High X, Medium____, Low____

Wetlands Frontage - High X, Medium____, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 2, types and locations:____
Adit #2A and #2B

Hazardous structures: Yes X, No____, Number 1, types and locations:____
Metal building where Adit #1 discharges

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 3,
types and locations: Highwall (15') associated with collapsed Adit #2C
is fenced on 3 sides but not on highwall side; adit #1 is collapsed with
trench; pit south of trench is undercut and approx. 20' deep.

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 1, types and locations: WR-1 is very steep, unvegetated, and
at angle of repose.

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Geology and Geochemical Study of Winston Mining District, Broadwater County, Montana, Bulletin 41, Written by F.N. Earll, November 1964.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Golden Age, Prepared by Northern Engineering and Testing, May 23, 1988.

USGS, Topographic Map, Winston, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

**GOLDEN AGE
PA NO. 04-050**

Golden Age PA# 04-050
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - FLAMMANG
INVESTIGATION DATE: 07/21/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
04-050-SE1	12.0	1690	32.7	13.9	4.4	1.6 UJX	219 JX	30200	0.06 J	6440	3.3 UJX	12400	11.7 UJ	1730 JX	NR
04-050-WR1	17.0	1410	60.6	6.3	1.6	1.2 UJX	51.7 JX	23400	0.14 J	1870	2.6 UJX	2790	9.2 UJ	945 JX	NR
04-050-WR2	15.6	11000	42.7	1.0	3.7	1.1 UJX	180 JX	59800	1.47 J	1850	2.3 UJX	756	8.3 UJ	77.4 JX	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL		SULFUR		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR		SULFUR	
	SULFUR %	ACID BASE U/1000t	NEUTRAL, POTENT. U/1000t	ACID BASE POTENT. U/1000t	SULFUR %	SULFUR %	SULFUR %	SULFUR %	SULFUR %	SULFUR %	ACID BASE U/1000t	ACID BASE U/1000t	ACID BASE U/1000t	POTENT. U/1000t	ACID BASE U/1000t	POTENT. U/1000t
04-050-WR1	1.77	55.3	24.0	-31	1.17	0.78	0.22	0.38	0.23	0.22	6.87	17.4	6.87	17.4	6.87	17.4
04-050-WR2	1.09	34.1	-2.95	-37.0	0.78	0.78	0.08	0.23	0.23	0.08	2.50	-5.44	2.50	-5.44	2.50	-5.44

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-050-AD1	0.12 U	72.7 J	10.8	4.0 U	8.4 U	6.8 U	5.9 U	233	0.14	26.7	14.4 U	1.9	51.6 U	15.6 U	50.8
04-050-AD2	0.12 U	13.4 J	11.7	4.0 U	8.4 U	6.8 U	5.9 U	92.8	0.14	12.6	14.4 U	0.4	51.6 U	54.4	115
04-050-SW1	0.12 U	13.7 J	9.0	4.0 U	8.4 U	6.8 U	5.9 U	50.2	0.14	7.4	14.4 U	2.9	51.6 U	178	88.9

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-050-AD1	124	<5	16	1.38	NR
04-050-AD2	182	<5	32	0.39	NR
04-050-SW1	160	<5	34	0.74	NR

LEGEND

SE1 - Downgradient of WR1.
WR1 - Composite of subsamples WR1A through 1D.
WR2 - Composite of subsamples WR2A and 2B.
BACKGROUND - From the Kleinmachau Mine (04-010-SS1).
AD1 - Discharge from adit #2A.
AD2 - Discharge from Adit #1, where it flows from a 6" pipe.
SW1 - Same as sample 04-050-SE1.

XRF ANALYSIS RESULTS

**GOLDEN AGE
PA NO. 04-050**

Mine Name: Golden Age PA# 04-050
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Tl	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
04-050-SE500		15735.4	12983.9	1339.82		4775.22	30020.2			140.435 *	1241.08	653.996	537.473
04-050-WR1A		30825	15339	449.202 *		969.11 *	41570.6			122.73 *	771.291	3063.78	127.706
04-050-WR1B		54896.7	11678.5	758.922		1500.23 *	52864			216.03 *	1950.69	2077.19	64.4952
04-050-WR1C		25482.6	19840.3	1131.67		5897.86	28629.7			120.196 *	786.263	345.233 *	607.327
04-050-WR1D		27384.6	16865.9	444.171 *		3284.7	18409.4				1243.52	535.979	333.689
04-050-WR1-COMP		29346.4	15303.1	751.651	228.441 *	1965.08 *	31357			77.2992 *	801.169	1415.8	276.808
04-050-WR2A		27752.3	3981.7	402.031 *		5214.86	95467.6			203.09 *	75.3946 *	11313	391.963
04-050-WR2B		26708	3782.18	479.468 *		1047.14 *	89312.6	821.711 *		198.183 *	148.456 *	11967.3	312.348
04-050-WR2B-DUP		28652.5	4026.09	416.754 *		715.334 *	89657.4			277.069 *	107.968 *	12238.4	313.233
04-050-WR2-COMP		30139.5	3842	504.774 *		3971.57	90653.4			201.091 *		12103.8	382.56
04-050-WR3		19111.2	10935.3	715.229 *	239.836 *	7281.02	26112.7			153.504 *	140.289 *	1337.63	733.999

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
04-050-SE500	132.767		9.85096 *	481.752	131.149					132.327 *		15.0618 *
04-050-WR1A	102.98		19.6206 *	4976.88	152.137			70.2562 *	1256.2			
04-050-WR1B	155.805			3078.14	215.714			80.0185 *	291.564			24.0511 *
04-050-WR1C	144.702		21.8097 *	547.01	146.248				245.602			
04-050-WR1D	121.208		25.4418 *	297.251	142.699				930.166			
04-050-WR1-COMP	141.622		20.4705 *	1977.18	156.565				681.462			
04-050-WR2A	124.323		110.879	622.932	237.728				532.945			32.8016 *
04-050-WR2B	151.218		67.4617	728.121	238.575				560.099		19.3445 *	
04-050-WR2B-DUP	133.796		78.2003	651.647	269.407				442.966			
04-050-WR2-COMP	109.975		103.8	671.655	240.465				425.036			
04-050-WR3	131.203		48.08		175.06				392.461		25.859 *	12.4995 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**GOLDEN AGE
PA NO. 04-050**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Golden Age
04-050

LINE NO.				
<u>GROUNDWATER PATHWAY</u>				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	24.897
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		13
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	15.5
10		GROUNDWATER SCORE	LINES 4 x 5 x 9	154361
<u>SURFACE WATER PATHWAY</u>				
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	450
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	26.004
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	19
24		SURFACE WATER SCORE	LINES 14 x 15 x 23	222334
<u>AIR PATHWAY</u>				
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		5
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	25
27		LIKELIHOOD SCORE	LINES 25 + 26C	25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.614
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34	1614
<u>DIRECT CONTACT PATHWAY</u>				
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.571
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	1
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43	157
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000			3.78

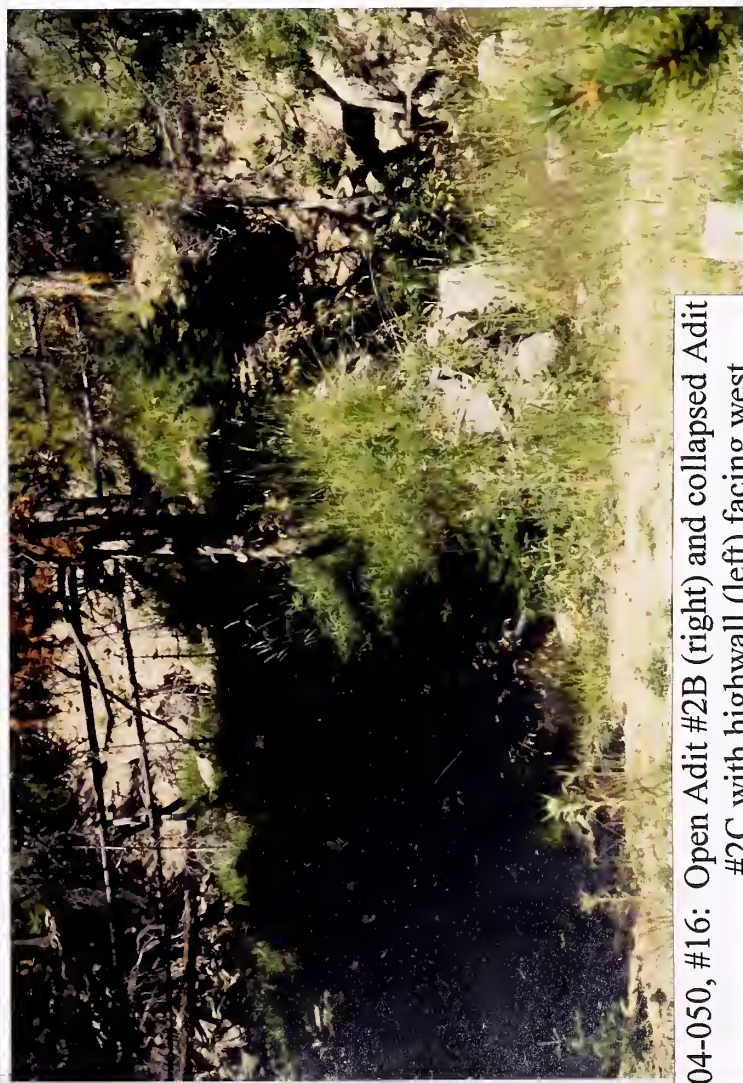
LINE NO.			SITE NAME:	Golden Age
			PA NUMBER:	04-050
	<u>SITE SAFETY</u>			
1	THREAT	ACCESSIBILITY		20
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4		UNSTAB. HIWALLS / PITS	75 EA.	225
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	365
9	TARGETS	POPULATION - 1 MILE		1
10		NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13	SITE SAFETY SCORE		(LINES 1 x 8 x 12) / 1,000	7.30



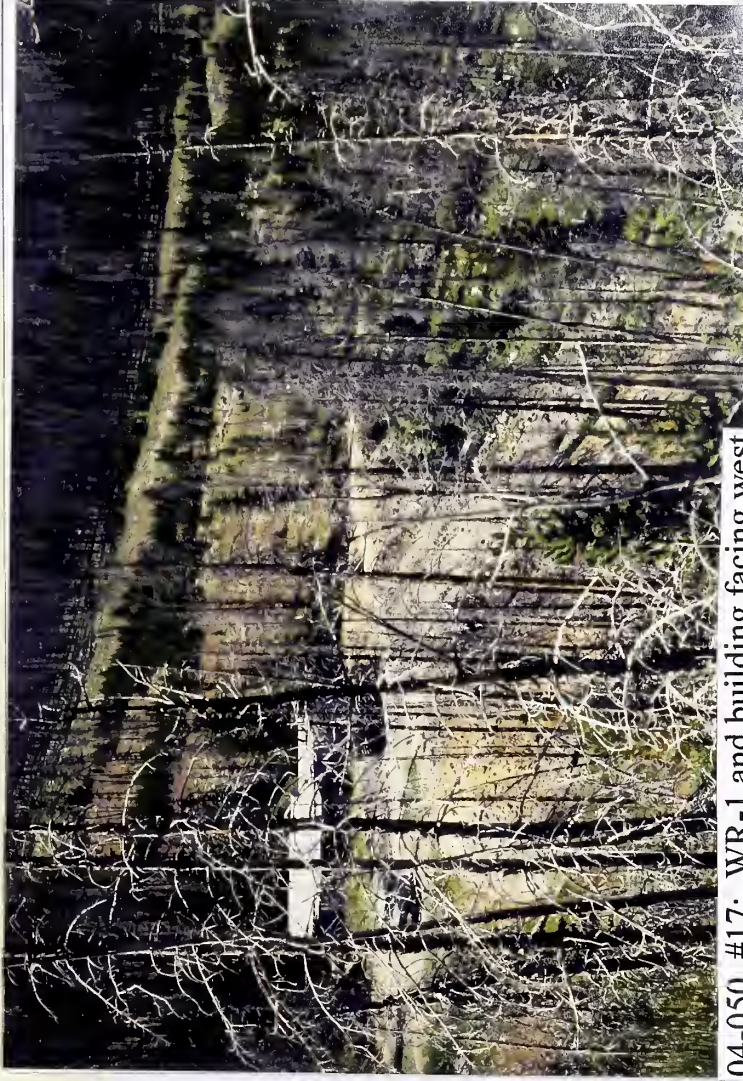
04-050, #14: Base of WR-2A; WR-2A (foreground) and WR-2B (left background) facing west



04-050, #15: Discharging Adit #2A (open with cable net closure); AD-1 sample location



04-050, #16: Open Adit #2B (right) and collapsed Adit #2C with highwall (left) facing west



04-050, #17: WR-1 and building facing west



04-050, #18: Collapsed Adit #1 (discharging); AD-2
sample location



04-050, #19: WR-1 facing east; adit discharge flowing
down waste rock (foreground) and erosion
gully (background)



04-050, #20: Hazardous building on-site

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: SUNRISE/JANUARY PA#: 04-130/04-126

Date: August 5, 1994 Time: 1045-1600

Field Team Leader: Flammang, Pioneer

Sampling Personnel: Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Sunny; hot (80°-95°F); slight breeze (5 mph).

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #16: WR-1 facing south, Weasel Creek at toe; #17: Discharging adit with pond, AD-1 sample location; #18: Discharging collapsed adit with highwall, AD-2 sample location; #19: WR-5 facing south and east; #20: WR-2 facing northwest; #21: Upgradient SW-2 sample location in Weasel Creek; #22: Upper WR-2 (foreground), loadout, and WR-4 (background); #23: WR-3 (foreground), highwall associated with Adit #2 (mid-ground), and WR-3A (background) facing east; #24: Downgradient SW-1 sample location in Weasel Creek discharge from base of dump associated with Adit #3 (unsampled).
Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Site was originally sampled under PA# 04-502 because actual site name was unknown. Later, all data were relabeled 04-130. It was determined later that all of the Sunrise and the majority of the January was sampled. Compared to Northern's 1988 inventory map for Sunrise samples, Pioneer's WR-6 corresponds to their #6; Pioneer's WR-3 corresponds to their #4; Pioneer's WR-5 corresponds to their #1, #2, and #3; and Pioneer's AD-1 and AD-2 corresponds to their #5 and #4. On the 1988 Northern inventory map for January samples, Pioneer's WR-2 and WR-4 corresponds with their #4; measurements were taken of Northern's #3 and #2 and labeled by Pioneer as WR-7 and WR-8.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Route adit discharges away and off of waste rock. Pull WR-1, WR-2, WR-3, and WR-6 away from creek and out of floodplain. Recontour, amend, and revegetate waste rock.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SUNRISE/JANUARY PA#: 04-130/04-126

Legal Description: T 8N ; R 1W ; Sec. 26 , S 1/2 SW 1/4 1/4

County: BROADWATER Mining District: WINSTON

Latitude: N 46° 24' 55" Longitude: W 111° 41' 48"

Primary Drainage Basin and Code: Beaver Creek/10030101

Secondary Drainage Basin: Weasel Creek

USGS Quadrangle map name(s): Winston

Mine Type/Commodities: Hardrock/Copper, Lead, Zinc, Silver, Gold

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private/Public

Owner, Agent, or Contact (Include address and phone when available): Unknown
(January); USFS (Sunrise)

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 5820'-6400', Slope 10°-30°,
Aspect East and North

Land use: Mining , Recreational , Residential X, Urban ,
Agricultural X, Other (Specify)

Area of disturbed/unvegetated lands? 3 acre(s) .

Site Dimensions: 850 feet x 1,200 feet

Predominant vegetation types: Douglas fir, grasses, raspberries

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X, trail .

Other logistical considerations (proximity to other sites). Golden
Age, Kleinschmidt, and Vosburg sites are further south on Weasel
Creek Road; East Pacific site 1/2 mile north.

Well logs within 1 mile radius; (Attach MEMG Well Log Printout(s): There are no wells reported within a 1 mile radius; however, a residence located 1/3 mile north of the site appears to be on a well.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on east and west side of Weasel Creek, which flows north away from the site to confluence with Beaver Creek 2.5 miles away. Beaver Creek flows 1.5 miles northeast to irrigation ditches. Any water remaining in the irrigation ditches flows into Canyon Ferry Reservoir 5.5 miles downgradient. The site was underlain by andesite and a small quartz monzonite stock.

Mining/milling history, ore type/tenor, host rock, gangue: The January first operated in 1899, with most recorded output in 1931. Underground workings were inaccessible by 1949. Average recovered metal content of all ore produced during 1901 to 1948 was 0.11% copper, 5.0% lead, 3.4% zinc, 5.3 ounces silver, and 0.108 ounces gold a ton. Deposit is a vein controlled by a fault fissure along and near the contact of the andesite and the quartz monzonite stock. Mineralization is auriferous pyrite, galena, and sphalerite with minor chalcopyrite, arsenopyrite, and tetrahedrite in a quartz rhodochrosite gangue.

Mine Operation?

Shafts - Yes___, No X, # ____, Comment_____

Adits - Yes X, No___, # 13, Comment 12 collapsed; 1 with small opening; 2 discharging

Pits - Yes___, No X, # ____, Comment_____

Placers - Yes___, No X, # ____, Comment_____

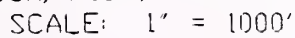
Other - Yes___, No X, # ____, Comment_____

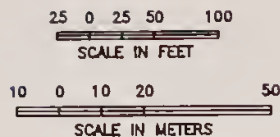
Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A





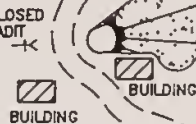
WR6
AREA= 250 SQ.M.
2710 SQ.FT.
300 SQ.YDS.
VOLUME= 300 CU.YDS.



WR7
AREA= 90 SQ.M.
1020 SQ.FT.
110 SQ.YDS.
VOLUME= 110 CU.YDS.

WR4
AREA= 630 SQ.M.
6790 SQ.FT.
750 SQ.YDS.
VOLUME= 750 CU.YDS.

OPEN ADIT

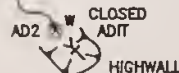


WEASEL CREEK ROAD
USFS ROAD #405

WR2
AREA= 3260 SQ.M.
35130 SQ.FT.
3800 SQ.YDS.
VOLUME= 2600 CU.YDS.

WR3
AREA= 700 SQ.M.
7500 SQ.FT.
630 SQ.YDS.
VOLUME= 5000 CU.YDS.

ADIT DISCHARGE



WR5A
AREA= 100 SQ.M.
1115 SQ.FT.
120 SQ.YDS.
VOLUME= 120 CU.YDS.



WR5B
AREA= 260 SQ.M.
2760 SQ.FT.
310 SQ.YDS.
VOLUME= 410 CU.YDS.



LEGEND

- | | | | |
|----------------|------------------------------------|-------|-------------------------------------|
| ⊗ | XRF SAMPLE | ===== | IMPROVED ROAD |
| ⊗ ^W | WATER SAMPLE
GROUND AND SURFACE | ----- | UNIMPROVED ROAD |
| — | OPEN ADIT | ▨ | STRUCTURE |
| + | COLLAPSED ADIT | ▲ | SLOPE DIRECTION |
| → | DRAINAGE | ⬢ | WASTE ROCK DUMP
OR TAILINGS PILE |
| → | DRY DRAINAGE | | |

GOLDEN AGE
UP-DRAINAGE

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

SUNRISE/JANUARY
PA# 04-130

DRAWING NO.: PT340236

REV: -

DATE: 11/16/94

PLOT SCALE: 1 = 40

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay):
N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Clark, West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (Yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	1,250	Just north of where AD-2 cuts WR-1; east face, near top	None	< 3.5 (D)	0.05	04-130-WR-1	08/05/94 1545	T-Metals, ABA
WR-1B	WR		Off knob on north end; east face, near top	None	< 3.5 (D)	0.025			
WR-2A	WR	2,600	North end of WR-2, lower level; east face, middle of pile	None	4.8 (D)	0.04	04-130-WR-2	08/05/94 1550	T-Metals, ABA
WR-2B	WR		South end of WR-2, lower level; east face, near top	None	< 3.5 (D)	0.03			
WR-2C	WR		Upper level; near bottom, middle of pile	None	< 3.5 (D)	0.03			
WR-3A	WR	5,000	Northwest side of WR-3 in gray material; 5' from base, 8' from creek	None	5.4 (D)	0.05	04-130-WR-3	08/05/94 1557	T-Metals, ABA
WR-3B	WR		Northwest side of WR-3 in orange material; 7' from base; 10' from creek	None	4.0 (D)	0.04			
WR-4A	WR	750	Waste rock above WR-2; near base, in middle	None	5.6 (D)	0.04			
WR-5A	WR	120	Lower flat waste rock; north face, near west end	None	6.4 (D)	0.03			
WR-5B	WR	410	Upper, vegetated pile; near middle on west face	None	5.9 (D)	0.03			
WR-6	WR	480	Waste rock on east side of creek, across from AD-1; west face, near middle	None	5.2 (D)	0.035	N/A	N/A	XRF Analysis

D-Direct reading (beta/gamma meter); B-Breathable Particulate (beta/gamma meter)

Comments or deviations from SOPs: 04-502-WR-1 is composite of WR-1A and -1B. 04-502-WR-2 is composite of WR-2A through -2C, and WR-4. 04-502-WR-3 is composite of WR-3A and -3B, and WR-5A and -5B. See Kleinschmidt (04-010) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 2 Identification: AD-1
associated with WR-1; AD-2 associated with WR-3

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes X, No , Number: 1 Identification: Seep at base
of unsampled waste rock at north end of site (AD-3) may be discharging
adit.

Groundwater wells within 4 miles?: Yes X, No ;
Number of well logs: 55

Distance to nearest well used for drinking:
 <1,000 ft; X 1,000 ft to 0.5 miles; >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Shallow groundwater; WR-1, WR-2, WR-3, and WR-6 are all uncontained
contain elevated metal values, and may be in contact with shallow
alluvial aquifer.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: Discharge from Adit #1 is being ponded and
apparently used for cattle watering.

GROUNDWATER INVENTORY FORM

SAMPLERS: West, Clark

[illegible]

Flow: Estimated (E) or Measured (M) from adit, shaft, seep or spring:

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Weasel Creek

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes X, No , Name(s)/Description: 10'x10' pond formed by Adit #1 discharge

Waste materials within any floodplain: Yes X, No Source ID(s): WR-1, WR-2, WR-3, and WR-6 are in Weasel Creek's floodplain.

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 0.76 cfs
High Flow: 7.5 cfs, Average Flow: 0.75 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between WR-1, WR-2, WR-3, and WR-6; 35 to 60 feet between WR-5; 500+ feet between WR-4 and upper two waste rock piles.

Surface water draining onto or through waste sources: Yes X, No ,
Describe: AD-1 discharge runs over WR-1; Weasel Creek cuts WR-1; AD-2 discharge flows adjacent to and under WR-3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, irrigation, recreation, fishing, USFS Wildlife Management Area, and drinking water source.

Observed erosional/sedimentation/stream turbidity problems? Yes , No X. Distance downstream (ft)? 0-500 ; 500-1,000 ; >1,000 .
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Cattle have disturbed the streambank through this site. Arsenic, lead, zinc, and copper are elevated in sediments 600 feet below the mine.

SAMPLERS: Clark

[illegible]

и (Н) перенесен до (Э) петимјет: 2011

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 2 acres adjacent to
WR-5

Wetlands present: Yes X, No , Describe: Very small streamside
wetlands identified

Carbonate rocks/soils: Yes , No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ; 10-30 ; 30-100 X;
100-300 ; 300-1,000 ; 1,000-3,000 ; 3,000-10,000 ; 10,000 or
greater ; Comments

Nearest residence: <1,000 ft; X 1,000 ft - 0.5 miles; >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Clark, West

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LINE)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	pH; FEOX; Minor SO3	Partial	11,250	10,690	Yes	Low
WR-2	pH	Partial	35,130	55,130	Yes	Low
WR-3	pH; SO3; FEOX	Partial	7,500	7,125	Yes	Low
WR-4	None	Dry	6,790	6,790	Yes	Low
WR-5A	SO3; FEOX	Dry	1,115	1,090	Yes	Low
WR-5B	None	Dry	2,760	550	Yes	None
WR-6	None	Dry	3,240	1,300	Yes	None
AD-1	None	N/A	N/A	N/A	N/A	N/A
AD-2	FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;

Evidence of recreational use on site: Yes X, No____, Describe: Beer cans

Accessibility (check each that apply): X Easily accessible - no fences, gates, or warning signs;____ Moderately Accessible - barbed wire fences, road gated, or signs posted;____ Difficult Access - chain-link fence, road gated and locked, site guarded (does not include locked or manned access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes X, No____, Comment Possible, open adit

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High X, Medium____, Low____

Wetlands Frontage - High X, Medium____, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 1, types and locations:____
Very small opening (1'x3') above WR-2

Hazardous structures: Yes X, No____, Number 8, types and locations:____
WR-5 - loadout, adit cover; WR-2 - loadout; WR-4 - 2 cabins; Second WR above WR-4 - cabin, adit portal; shed near AD-1; WR-6 - adit portal

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 1, types and locations:____
Highwall associated with AD-2 is approximately 30 feet high.

Unstable waste piles, impoundments, undercut banks: Yes X, No____, Number 5, types and locations:____
WR-1 is being undercut by Weasel Creek. WR-1, WR-2, WR-3, and WR-4 are steep, unvegetated and at angle of repose.

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

- MBMG, Economic Geology and Geochemical Study of Winston Mining District, Broadwater County, Montana, Bulletin 41, Written by F.N. Earll, November 1964.
- MBMG, Mines and Mineral Deposits (Except Fuels), Broadwater County, Montana, Information Circular 7592, Written by Glenn C. Reed, April 1951.
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- MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for January and Sunrise, Prepared by Northern Engineering and Testing, June 20 and 22, 1988.
- USGS, Geology and Mineral Deposits, East Flank of the Elkhorn Mountains, Broadwater County, Montana, Professional Paper 665, Author Unknown, Date Unknown.
- USGS, Topographic Map, Winston, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

**SUNRISE/JANUARY
PA NOS. 04-130/04-126**

SOLID MATRIX ANALYSES

Metals in soils Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
04-130-SE1	3.5 J	361	77.7	16.8	7.0	4.2	145	24500	0.09 J	761	3.7 U	860	13.4 UJ	2170	NR
04-130-SE2	1.8 J	312	63.0	7.3	7.1	5.1	130	23300	0.03 J	624	3.0 U	321	10.8 UJ	797	NR
04-130-WR1	63.9 J	905	168	8.8	3.8	1.2 U	489	39600	0.63 J	371	2.6 U	10400	28.2 J	1600	NR
04-130-WR2	70.7 J	614	64.0	24.8	6.1	17.9	515	32200	0.21 J	1020	5.0	15900	42.8 J	4070	NR
04-130-WR3	0.8 UJ	402	47.1	1.5	11.5	4.9	95.7	43100	0.03 J	1590	6.3	83.5	9.9 UJ	162	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC ACID BASE POTENT.	
	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t
04-130-WR1	1.93	60.3	-1.98	-62	1.69	0.07	0.17	2.19	0.17	4.17		
04-130-WR2	0.99	30.9	4.71	-26	0.72	0.16	0.11	5.00	0.11	-0.29		
04-130-WR3	1.25	39.0	58.3	19.3	0.39	0.67	0.19	20.9	0.19	37.4		

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-130-AD1	0.12 U	1.1 U	9.6	128	8.4 U	6.8 U	106	117	0.16 JX	5210	20.6	0.4	54.3	26000	838
04-130-AD2	0.12 U	29.0	5.5 U	4.0 U	8.4 U	6.8 U	5.9 U	572	0.17 JX	30.4	14.4 U	0.4 U	51.6 U	23.3	212
04-130-SW1	0.12 U	16.5	7.2	10.7	8.4 U	6.8 U	5.9 U	138	0.13 JX	39.4	15.5	4.6	51.6 U	1060	119
04-130-SW2	0.12 U	18.8	5.5	4.0 U	8.4 U	6.8 U	5.9 U	119	0.16 JX	10.4	14.4 U	3.1	51.6 U	217	90.9

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-130-AD1	981	<5.0	699	<0.05	NR
04-130-AD2	244	<5.0	83	0.61	NR
04-130-SW1	170	<5.0	62	0.47	NR
04-130-SW2	72	<5.0	37	0.56	NR

LEGEND

SE1 - 100' below last add, below where lowest steep corner is.
SE2 - 150' upstream of WR5.
WR1 - Composite of subsamples WR1A and 1B.
WR2 - Composite of subsamples WR2A through 2C and WR4.
WR3 - Composite of WR1A, 3B, 5A, and 5B.
BACKGROUND - From the Klamath River (04-010-SS1).

AD1 - Discharge from add south of WR1.
AD2 - Discharge from add above WR3.
SW1 - Same as sample 04-502-SE1.
SW2 - Same as sample 04-502-SE2.

XRF ANALYSIS RESULTS

SUNRISE/JANUARY
PA NOS. 04-130/04-126

Mine Name: Sunrise/January PA# 04-130/04-126
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
04-130-SE500		18357	18210.1	1414.75		1976.73 *	28068.7	508.066 *		137.066 *	2205.03	254.051 *	597.474
04-130-WR1A		28929.7	20015.5	524.284 *			48589.4	778.154 *		780.217	1252.83		161.755
04-130-WR1B		26235.3	34468.2	668.099		1606.7	35470.9			127.605 *		607.199	112.389
04-130-WR1-COMP		27582.6	28332.8	378.668 *	566.222 *	1666.46 *	36954.4	576.309 *		417.255	497.813	355.733 *	135.596
04-130-WR2A		22357.6	20883.8	1242.13		2358.1	29560.7	467.274 *		473.596	9375.67	174.845 *	247.015
04-130-WR2B		27457	14718	598.67 *		1633.46 *	37317.4			325.513 *	466.318	211.097 *	401.585
04-130-WR2C		26820	12749.1	1355.28		533.781 *	42475.8			631.77	2153.22	486.224 *	281.193
04-130-WR2-COMP		27193.3	12204.2	927.323	404.988 *	2252.48	35140	936.775 *		485.205	3041.9		292.772
04-130-WR3A		28341.5	31247.7	2151.99		3585.06	35746.2			250.119 *	150.582 *	132.485 *	159.193
04-130-WR3B		19568.9	37813.5	1471.25		597.016 *	59326			137.438 *		1108.65	108.352
04-130-WR3B-DUP		20174.9	39409.2	1409.33		1183.64 *	60364			143.724 *		1082.24	106.382
04-130-WR3-COMP		21029	26699.7	1848.1		2340.6	57913.2			126.709 *	128.133 *	584.909	207.801
04-130-WR4A		25011.7	6276.77	1237.02		3083	38516.5			967.523	4870.21		172.23
04-130-WR5A		40892.3	24712.4	576.463 *		2846.51	37978.8			171.794 *	252.418 *	170.556 *	104.274
04-130-WR5B		18239	17510.2	2781.03		1749.99 *	70514.6	876.493 *		204.297 *	213.64 *	270.708	451.671
04-130-WR6		20589.3	34000.4	2390.97		1518.4 *	34380.5			131.679 *			568.648

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
04-130-SE500	202.289			412.245	99.6047				796.431			28.8595 *
04-130-WR1A	101.148		19.3132 *	11943.7	169.513			125.796 *	577.662	137.403 *		73.8362 *
04-130-WR1B	139.819				168.952				183.898	26.8597 *		
04-130-WR1-COMP	132.013		14.4726 *	3615.74	167.042				447.583			56.7488 *
04-130-WR2A	170.092			1565.09	127.482				639.999	103.983 *	20.2472 *	19.6203 *
04-130-WR2B	150.905			807.688	141.075				752.158			19.8625 *
04-130-WR2C	172.595		16.242 *	4959.24	134.741				699.981			34.3438 *
04-130-WR2-COMP	149.391	82.2517 *	22.223 *	2821.98	160.681				600.039			44.5203 *
04-130-WR3A	126.15		16.6741 *	84.1534 *	155.139				466.982			16.2367 *
04-130-WR3B	111.707			54.0764 *	117.93				197.16			12.1111 *
04-130-WR3B-DUP	106.434		14.6228 *	79.7136 *	109.463				186.578			
04-130-WR3-COMP	120.853		9.71569 *		138.316				356.967			15.1706 *
04-130-WR4A	147.365		75.912	6280.66	135.57			58.2348 *	329.382	125.697 *		36.1093 *
04-130-WR5A	119.674		9.65845 *	46.4323 *	271.475				393.215			10.265 *
04-130-WR5B	150.005		14.4005 *		90.7966				533.745			12.323 *
04-130-WR6	135.369				86.7669				549.494			10.4008 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**SUNRISE/JANUARY
PA NO. 04-130**

ABANDONED AND LOST IN THE
RECENT PAST

FOR THE
IN THE

MOST COMMON

AIMSS SCORESHEET

SITE NAME:

Sunrise/January

PA NUMBER:

04-130

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI	55
8		NEAREST WELL	5
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
			1558560
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	300
12	SW - LIKELIHOOD	EXCEEDENCES	100
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	1
18		WETLANDS	10
19	SW - TARGETS	FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
			1090706
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	5
31	AIR - TARGETS	WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
			6874
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF	ACCESSIBILITY	20
37B	EXPOSURE	DISTANCE TO POPULATION	10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	1
41	TARGETS	NEAREST RESIDENCE	5
42		RECREATIONAL USE	5
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
			7629
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		26.64

SITE NAME:
PA NUMBER:

Sunrise/January
04-130

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	320
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	495
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	11
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	108.90



04-130, #16: WR-1 with Weasel Creek at toe facing south



04-130, #17: Discharging adit with pond; AD-1 sample location



04-130, #18: Discharging adit (collapsed) with highwall; AD-2 sample location



04-130, #19: WR-5 facing south and east



04-130, #20: WR-2 facing northwest



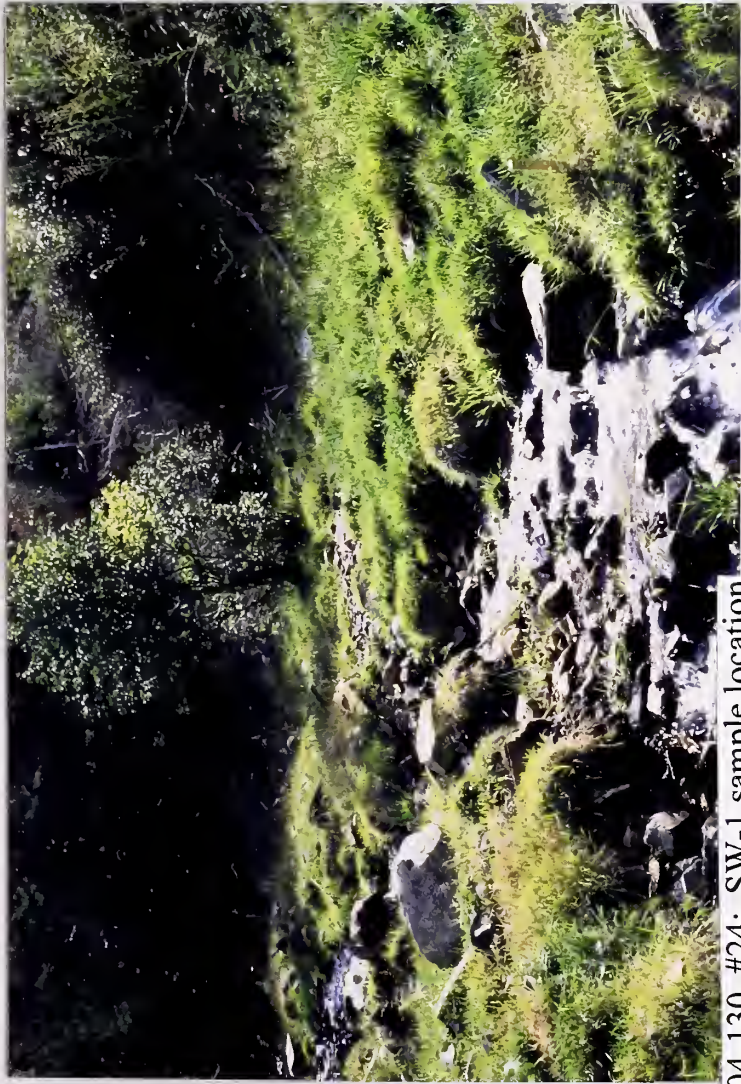
04-130, #21: SW-2 sample location



04-130, #22: Upper WR-2 (foreground), loadout, and WR-4 (background)



04-130, #23: WR-3 (foreground), WR-3A (background), and highwall at Adit #2 (mid-ground) facing east



04-130, #24: SW-1 sample location

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): AURORA MINE AND MILLSITE PA#: 04-500

Legal Description: T 8N ; R 1W ; Sec. 13 , SE 1/4 NE 1/4 SW 1/4

County: BROADWATER Mining District: WINSTON

Latitude: N 46° 26' 55" Longitude: W 111° 39' 45"

Primary Drainage Basin and Code: Missouri River/10030101

Secondary Drainage Basin: Iron Age Gulch

USGS Quadrangle map name(s): Winston

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district: Included in the Chartam group of mines

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? Mine application permit encompassing this area entered in 1987; status unknown.

General site features: Elevation 4650'-4700', Slope 20°-25° , Aspect Northeastern

Land use: Mining X , Recreational X , Residential , Urban ,
Agricultural X , Other (Specify)

Area of disturbed/unvegetated lands? None acre(s) .

Site Dimensions: N/A

Predominant vegetation types: Grass, sagebrush

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites). South of Custer, General Sherman mines, and Custer millsite.

Well logs within 1 mile radius; (Attach MEMG Well Log Printout(s): There are 12 wells reported within a 1 mile radius; some of these are probably monitoring wells for the Chartam Project.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the west side of Iron Age Gulch. Water leaving the site would flow northeast to confluence with unnamed tributary to an irrigation ditch. Water in the ditch would flow into Canyon Ferry Reservoir approximately 5 miles to the southeast. Groundwater movement in the area is generally to the east. The numerous veins in the area are in andesite of Elkhorn volcanics near a small stock of quartz monzonite and aplite.

Mining/milling history, ore type/tenor, host rock, gangue: Patented in 1881. Production records indicate initial production was stopped by 1907. Mine appears to be on an extension of Iron Age vein. Vein material in Iron Age vein was pyrite in quartz gangue with minor base metal sulfides. Most veins not developed beyond oxide zone so gangue also contained limonite.

Mine Operation?

Shafts - Yes , No X, # , Comment
Adits - Yes X, No , # 1, Comment Open
Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes , No X, # , Comment

Mill Operation? Yes X, No . If yes answer the next three questions:

Period(s) of Operation: Unknown

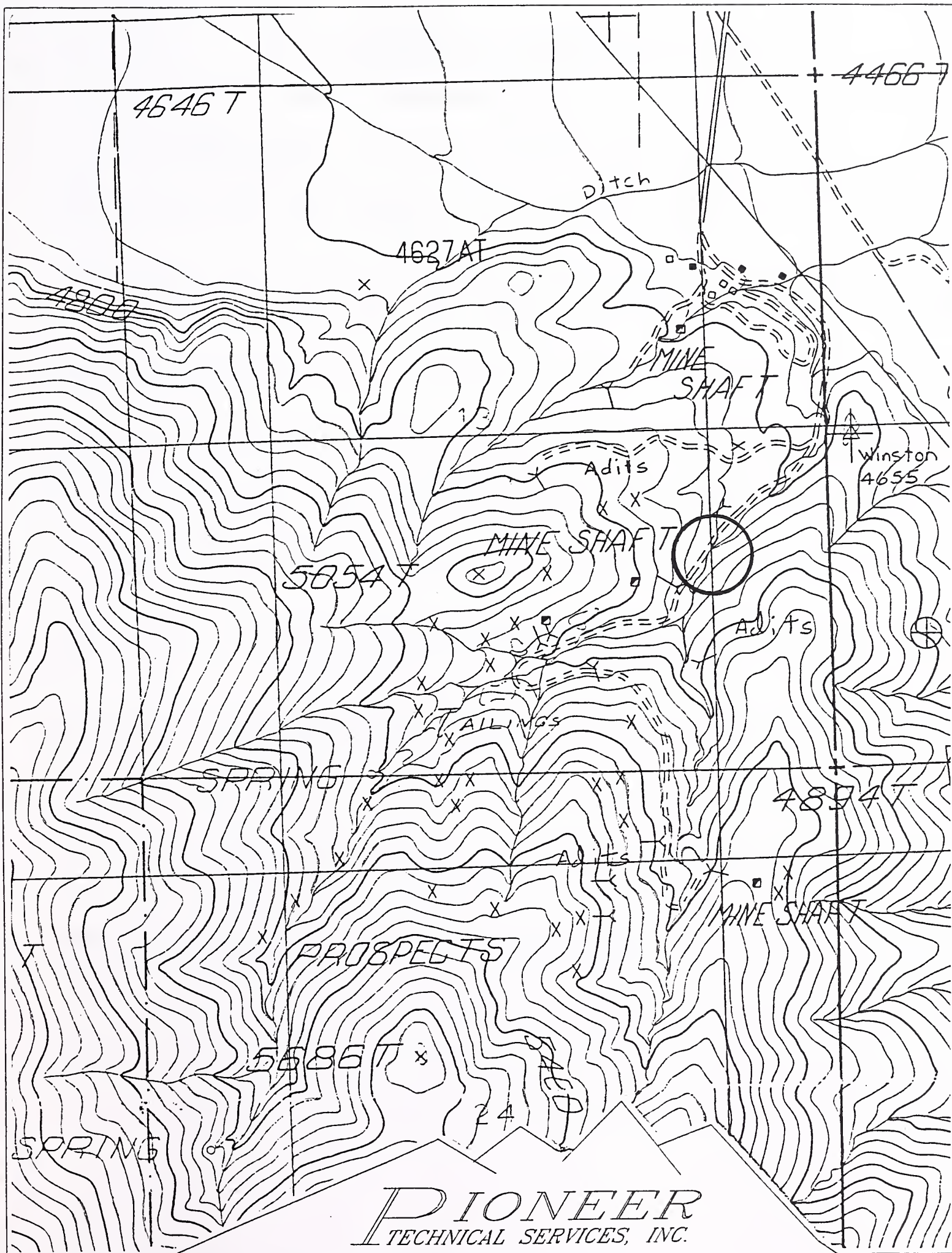
Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Unknown; no tailings were found.

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

Well No.	Location	Depth	Yield	Static Water Level
M:57132	08N 01W 12 A	500.0	5.0	20.00
M:57133	08N 01W 12 AC	300.0	5.0	51.00
M:57134	08N 01W 12 CA	200.0	10.0	24.00
M:122495	08N 01W 12 CA	160.0	3.0	47.50
M:20648	08N 01W 12 CDC	183.0	0.0	14.00
M:57135	08N 01W 13 AA	49.0	5.0	15.00
M:57137	08N 01W 13 AB	100.0	4.0	20.00
M:57136	08N 01W 13 AB	103.0	12.0	18.00
M:20649	08N 01E 18	140.0	50.0	30.00
M:20651	08N 01E 18	260.0	0.0	78.00
M:20650	08N 01E 18	200.0	8.0	40.00
M:20652	08N 01E 18 BC	71.0	17.0	50.00



AURORA MINE/MILLSITE, P.A. NO. 04-500

T08N, R01W, SECTION 13

SCALE: 1" = 1000'

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SAMPLERS:

[illegible]

D-Direct reading(Kelwy Meter) : S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs:

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:_____

Filled shafts: Yes___, No X, Number:___ Identification:_____

Seeps/Springs: Yes___, No X, Number:___ Identification:_____

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 93

Distance to nearest well used for drinking:

___<1,000 ft; X 1,000 ft to 0.5 miles; ___>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible___, Unlikely X.

No sources; no water

Approximate Depth to Groundwater: ___<25 ft; X 25 - 100 ft; ___>100 ft.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS:

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes X, No____, Name(s): Iron Age Gulch

Other surface water: Yes____, No X, Name(s)/Description: _____

Waste materials within any floodplain: Yes____, No X Source ID(s): _____

Approximate Flood frequency? ____1 yr, ____10 yr, ____100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)?
No sources

Surface water draining onto or through waste sources: Yes____, No X,
Describe: _____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Canyon Ferry Reservoir has recreation, agriculture, irrigation, fishery and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000____.
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): _____

SAMPLERS:

4 (M) persons so (S) persons : 4072

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; X 1,000 ft - 0.5 miles; ___>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

SAMPLERS:

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply):____ Easily accessible - no fences,
gates, or warning signs; X Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High X, Medium____, Low____

Wetlands Frontage - High X, Medium____, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 1, types and locations:____
Adit

Hazardous structures: Yes____, No X, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

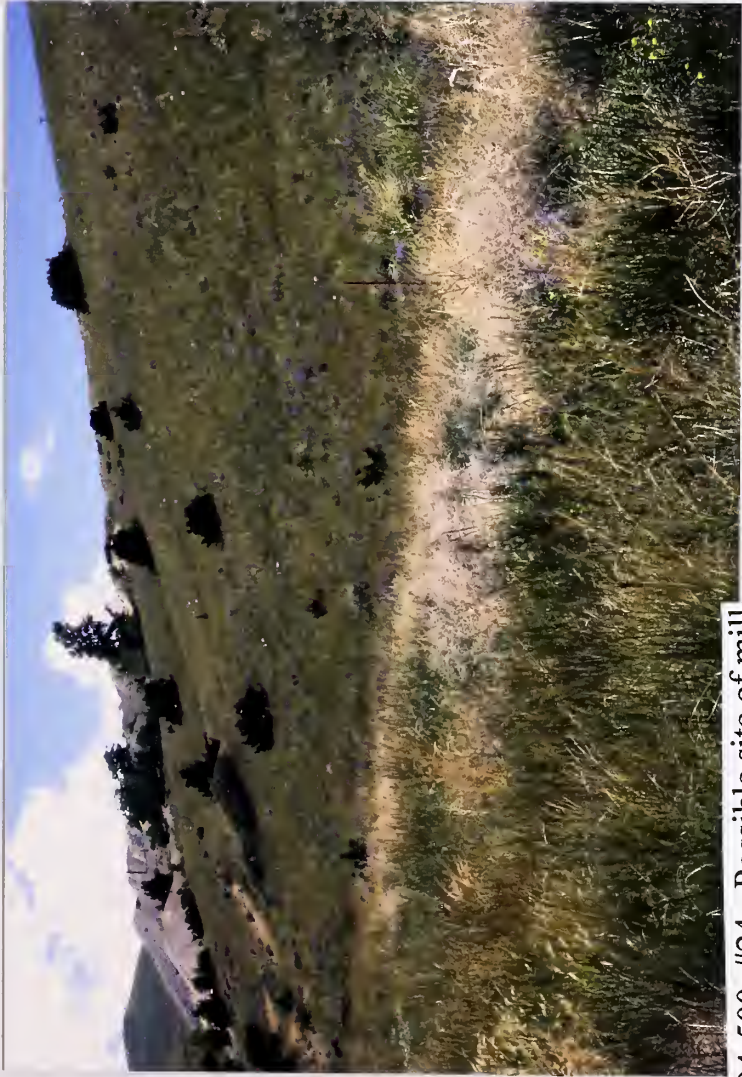
MBMG, Economic Geology and Geochemical Study of Winston Mining District, Broadwater County, Montana, Bulletin 41, Written by F.N. Earll, November 1964.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Chartam Project Operating Permit, Volumes I and II, Prepared by Western Energy Company, January 1987.

USGS, Topographic Map, Winston, Montana, 7 1/2 minute Quadrangle, 1986.



04-500, #24: Possible site of mill



04-500, #25: Open adit at millsite



04-500, #26: Dumps at millsite

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: CHARTAM PA#: 04-501

Date: June 22, 1994 Time: 1000-1300

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: Ranch hand using area for cattle grazing

Weather/Seasonality Observations: Mostly sunny; hot (approx. 85°F); slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #16: SW-2 sample location, downstream in Iron Age Gulch; #17: Top of WR-3 (graded); #18: WR-3 proximity to Iron Age Gulch; #19: WR-1 from west (Martha W.); #20: Open pit (Edna Claim) with highwall; #21: East half of WR-2 (Aurora Claim); #22: Center of WR-2 with adits; #23: West half of WR-2 with buildings and stream. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Several pits, drill pads, trenches, and roads all over the property. Only sampled larger dumps and those near surface water bodies.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock dumps lying within Miller Gulch and Iron Age Gulch should be moved and recontoured/revegetated.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): CHARTAM PA#: 04-501

Legal Description: T 8N ; R 1W ; Sec. 13 , 1/4 1/4 1/4
Sec. 24 , 1/4 1/4 1/4

County: BROADWATER Mining District: WINSTON

Latitude: N 46° 26' 52" Longitude: W 111° 39' 45"

Primary Drainage Basin and Code: Missouri River/10030101

Secondary Drainage Basin: Iron Age Gulch

USGS Quadrangle map name(s): Winston

Mine Type/Commodities: Hardrock/Silver, Gold

Activity Status: Active ☐ , Inactive/Exploration ☒ , Abandoned ☐ .

Ownership: Known ☒ Y ☐ N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Western Energy Co., but may have changed ownership since 1987.

Relationship to other mines/sites in the area/district: Includes most of the 13 mines comprising the Iron Age Group.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? References state that the last operating permit was in 1987.

General site features: Elevation 4600'-4900' , Slope 15° ,
Aspect Southeast and Northwest

Land use: Mining ☒ , Recreational ☐ , Residential ☐ , Urban ☐ ,
Agricultural ☒ , Other (Specify) ☐

Area of disturbed/unvegetated lands? 7.5 acre(s) .

Site Dimensions: 800 feet x 400 feet

Predominant vegetation types: Aspen, cottonwood, weeds, and bunch grass

Access: roads - good (paved) ☐ , poor (maintained dirt road) ☐ ,
4wd ☒ , trail ☐ .

Other logistical considerations (proximity to other sites). Locked gate at entrance.

Well logs within 1 mile radius; (Attach MEMG Well Log Printout(s): There are 12 wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on and in intermittent Iron Age Gulch and Miller Gulch. Water leaving the site would flow northeast in Iron Age Gulch to an unnamed tributary of an irrigation ditch. Water in ditch flows into Canyon Ferry Reservoir approximately 4.5 miles southeast of the site. Groundwater in the area has a generally eastern flow. Site is underlain by andesite of Elkhorn volcanics and quartz monzonite and aplite of the Edna stock.

Mining/milling history, ore type/tenor, host rock, gangue: Vein mineralization in the Iron Age group of mines is auriferous pyrite in a quartz gangue with very minor base-metal sulfide minerals.

Mine Operation?

Shafts - Yes ☐, No ☒, # , Comment
Adits - Yes ☒, No ☐, # 2, Comment 1 open
Pits - Yes ☒, No ☐, # 1, Comment
Placers - Yes ☐, No ☒, # , Comment
Other - Yes ☐, No ☒, # , Comment

Mill Operation? Yes ☐, No ☒. If yes answer the next three questions:

Period(s) of Operation: N/A

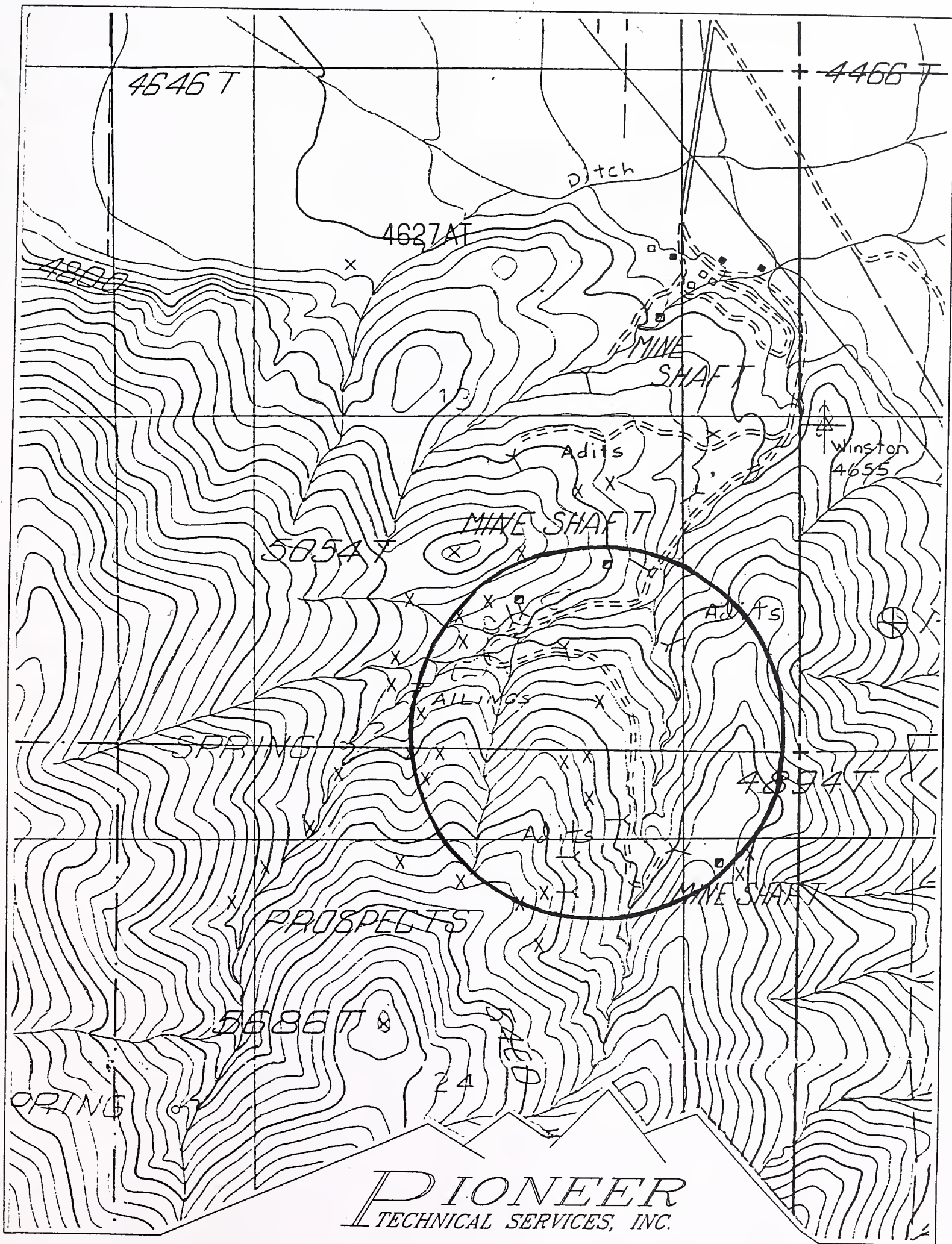
Origin of Ore Milled - Custom Mill ☐ Dedicated Mill ☐; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

08/12/1994

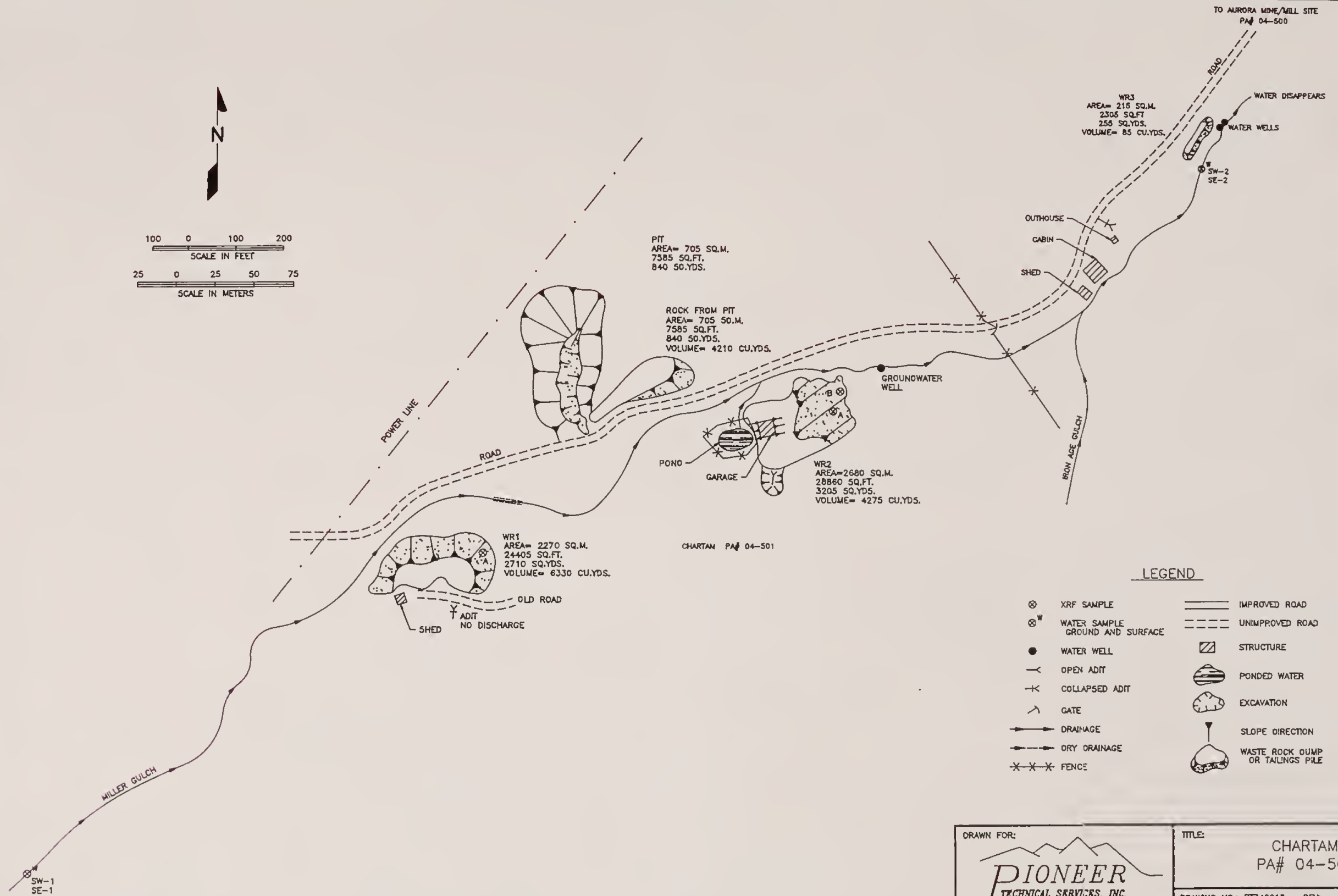
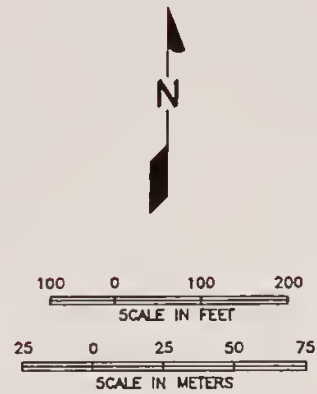
Well No.	Location	Depth	Yield	Static Water Level
57132	08N 01W 12 A	500.0	5.0	20.00
M:57133	08N 01W 12 AC	300.0	5.0	51.00
M:57134	08N 01W 12 CA	200.0	10.0	24.00
M:122495	08N 01W 12 CA	160.0	3.0	47.50
M:20648	08N 01W 12 CDC	183.0	0.0	14.00
M:57135	08N 01W 13 AA	49.0	5.0	15.00
M:57137	08N 01W 13 AB	100.0	4.0	20.00
M:57136	08N 01W 13 AB	103.0	12.0	18.00
M:20649	08N 01E 18	140.0	50.0	30.00
M:20651	08N 01E 18	260.0	0.0	78.00
M:20650	08N 01E 18	200.0	8.0	40.00
M:20652	08N 01E 18 BC	71.0	17.0	50.00



CHARTAM, P.A. NO. 04-501

T08N, R01W, SECTION 13

SCALE: 1" = 1000'



DRAWN FOR: PIONEER TECHNICAL SERVICES, INC.	TITLE: CHARTAM PA# 04-501
	DRAWING NO.: PTJ40218 DATE: 12/8/94	REV: - PLOT SCALE: 1 = 60

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay):
N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SAMPLERS: Tuesday, West

[illegible]

1b-Direct reading(Kelway Meter) ; S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 04-501-WR-1 is grab of WR-1. 04-501-WR-2 is composite of WR-2A and -2B. 04-501-WR-3 is grab of WR-3. See Kleinschmidt (04-010) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:___

Filled shafts: Yes___, No X, Number:___ Identification:___

Seeps/Springs: Yes X, No___, Number:___ Identification: Above site in Miller Gulch

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 93

Distance to nearest well used for drinking:

___ <1,000 ft; ___ 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible X, Unlikely___.

Since no adits were discharging and several were at the same elevation as the stream, the stream could possibly be perched. Possible potential for groundwater contamination because of uncontained sources and migrating contaminants.

Approximate Depth to Groundwater: ___ <25 ft; X 25 - 100 ft; ___ >100 ft.

Other observations/notes: Several groundwater wells were observed that were locked and welded closed during this investigation. The wells could not be sampled, but data has been collected in previous investigations, probably the baseline environmental assessment prepared Western Energy's operating permit application.

SAMPLERS:

Flow: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Miller Gulch

Dry streambeds: Yes X, No , Name(s): Iron Age Gulch

Other surface water: Yes X, No , Name(s)/Description: Pond near WR-2, possibly for drilling work

Waste materials within any floodplain: Yes X, No Source ID(s): WR-1, WR-2, and WR-3

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 15 gpm

High Flow: 0.1 cfs, Average Flow: Dry

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No , Describe: Miller Gulch flows over lower portion of WR-2.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Canyon Ferry Reservoir is used for agriculture, recreation, fishery, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes , No X. Distance downstream (ft)? 0-500 ; 500-1,000 ; >1,000 . Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SAMPLERS: Belanger

[illegible]

Δ(M) per neuron so (E) potential: NOT

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Cattle in stream above upgradient sample caused turbidity.

•

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, West

[illegible]

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe: Cattle use site for grazing, occasional rancher

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes X, No____, Describe: Litter;
bullet holes in signs

Accessibility (check each that apply): _____ Easily accessible - no fences,
gates, or warning signs; X Moderately Accessible - barbed wire fences,
road gated, or signs posted; _____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High X, Medium____, Low____

Wetlands Frontage - High X, Medium____, Low____

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 3, types and locations:____
Two adits at WR-2 and one near WR-3

Hazardous structures: Yes X, No____, Number 1, types and locations:____
Cabin along road near gate; shed present at WR-2 is sound.

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 1,
types and locations: Large open pit

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Economic Geology and Geochemical Study of Winston Mining District, Broadwater County, Montana, Bulletin 41, Written by F.N. Earll, November 1964.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Chartam Project Operating Permit, Volume I and II, Prepared by Western Energy Company, January 1987.

Northern Testing Laboratories, Report of Geotechnical Investigation, Hard Rock Mine Dump and Mill Pond Project, Western Montana, November 1982.

USGS, Geology and Mineral Deposits, East Flank of the Elkhorn Mountains, Broadwater County, Montana, Professional Paper 665, Author Unknown, Date Unknown.

USGS, Topographic Map, Winston, Montana, 7 1/2 minute Quadrangle, 1986.

LABORATORY ANALYTICAL DATA

CHARTAM
PA NO. 04-501

Chartam PA# 04-501
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/22/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
04-501-SE1	1.2	8.2	83.8 J	1.4	9.7	12.5 J	29.1	25600	0.03 U	397 J	8.9	42.6	7.0 U	201	NR
04-501-SE2	13.5	4880	117 J	49.1	17.0	13.3 J	306	52100	0.14	1940 J	10.0	3770	16.0	7930	NR
04-501-WR1	3.8	217	32.0	1.0 J	1.2 U	0.6 U	47.8	14200	2.12 JX	66.5	1.1 U	109	4.0 UJ	190 J	NR
04-501-WR2	4.8	1740	29.5	55.0 J	13.6	8.2	169	35700	0.14 JX	4580	10.9	1440	19.0 J	7630 J	NR
04-501-WR3	23	10300	71.1	48.0 J	12.5	9.2	515	72000	0.34 JX	1120	2.6	8070	12.9 J	3030 J	NR
BACKGROUND	0.8 U	98.6	130	0.8 U	11.8	5.9 JX	49.1 JX	24600	0.05 J	947	3.8 JX	29.2	10.2 UJ	64.9 JX	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		ACID BASE		NEUTRAL POTENT.		SULFUR ACID BASE		SULFATE		PYRITIC		PYRITIC		SULFUR ACID BASE	
	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t
04-501-WR1	0.34	10.6	-2.59	-13	0.32	0.01	0.01	0.01	0.01	0.01	0.31	-2.90				
04-501-WR2	2.04	63.7	21.3	-42	1.06	0.78	0.2	24.4	0.2	24.4	27.2	-3.05				
04-501-WR3	2.03	63.4	1.20	-62	1.20	0.55	0.28	-16.0	0.28	17.2	17.2	-16.0				

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
04-501-SW1	0.16	4.6	58.0	2.6 U	8.7 U	4.7 UX	11.2	2680	0.11 U	113	8.0 U	23.8 J	29.4 U	74.4	135
04-501-SW2	0.12 U	8.3	36.3	2.6 U	8.7 U	5.0 JX	4.6 U	14.2	5.48	4.4 U	8.0 U	2.3	29.4 U	9.9	295

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
04-501-SW1	175	5.2	30	0.44	NR
04-501-SW2	396	<5.0	167	0.65	NR

LEGEND

SE1 - Upstream in Miller Gulch.
SE2 - Downstream in Iron Age Gulch after confluence with Miller Gulch.
WR1 - Grab sample of the WR1 subsample.
WR2 - Composite of subsamples WR2A and 2B.
WR3 - Grab sample of the WR3 subsample.
BACKGROUND - From the Kleinheim Mine (04-010-SS1).

SW1 - Same as sample 04-501-SE1.
SW2 - Same as sample 04-501-SE2.

XRF ANALYSIS RESULTS

**CHARTAM
PA NO. 04-501**

FOR RELEASE 1975

IN 1975

1975-1976

Mine Name: Chartam PA# 04-501
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHl	K	Ca	Tl	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
04-501-WR1		33067.7	2559.16	277.435 *		478.759 *	28471.4			79.704 *	820.576	443.002	82.3948
04-501-WR2A		15475.6	19731.3	1048.7		5687.98	51705.2			111.605 *	2546.58	2469.85	322.951
04-501-WR2B		20152.6	27150.6	896.642		1592.54 *	46193				1322.57	2004.11	275.318
04-501-WR2-COMP		17953.7	23994.5	1077.67		3687.6	47061.2			125.905 *	2168.1	2673.04	252.362
04-501-WR3		22004.6	17659.4	1510.72		1742.61 *	80127.9			431.917 *	2770.97	7632.46	294.555

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
04-501-WR1	111.159		11.3812 *	77.0994 *	166.152				389.587			16.2715 *
04-501-WR2A	100.966		28.1787 *	1811.6	134.406				413.382			
04-501-WR2B	115.828		21.0557 *	1008.37	140.568				372.172			15.0513 *
04-501-WR2-COMP	108.003		34.8806	1603.22	127.946				314.516			
04-501-WR3	159.012		41.8253 *	4382.62	196.138				506.1			

* = Estimated Quantity

\$ = Unvalidated Data

**SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES**

SUMMARY OF GROUNDWATER QUALITY ANALYSIS - WECO CHARTER

SITE NAME	WE-2	WE-3	WE-4	WE-4	WE-5	WE-5	WE-6	WE-6	WE-7	WE-7
SAMPLE DATE	05/16/84	05/28/85	05/16/84	10/14/84	02/12/84	04/13/84	05/16/84	10/03/84	05/16/84	07/17/84
LAB	NET	LYNDES	NET	NET	NET	NET	NET	NET	NET	NET
PHYSICAL PARAMETERS										
SPEC. COND. (UMHDS/CM) LAB	482	450	382	305	473	473	331	363	390	460
PH LAB	7.2	6.3	7.0	7.6	7.2	7.6	7.0	7.0	7.6	7.7
TOTAL SUSP. SOLIDS	312	276	232	272	326	307	208	240	238	272
TDS MEAS. @ 180 DEG. C	0.76		0.83		0.32	0.42	0.20		0.45	
SODIUM ADSORPTION RATIO										
COMMON IONS										
TOTAL HARDNESS AS CaCO3	204	209	146		223	243	164		174	
CALCIUM (CA)	66	64	45	35	71	76	49	42	55	70
MAGNESIUM (MG)	13	12	0		11	13	10		9	
SODIUM (NA)	27	16	23	21	11	15	6	3	14	22
POTASSIUM (K)	2	2.0	1		3	2	1		2	
ACIDITY AS CaCO3	0		0				0		0	
ALVAILINITY AS CaCO3 (LAB)	146	139	126	126	136	127	124	120	139	151
BICARBONATE (HCO3) (LAB)	178	170	154		166	155	151		170	194
CARBONATE AS CO3 (LAB)	0	0	0		0	0	0		0	0
HYDROXIDE (OH)	0		0		0	0	0		0	
SULFATE (SO4)	98	83	54	51	103	121	39	31	55	70
CHLORIDE (CL)	15	13	7	7	0	6.9	4		7	
FLUORIDE (F)	0.35	0.21	0.17		0.32	0.28	0.60		0.85	
NUTRIENTS										
NITRATE (NO3-N)	1.12	1.2	1.07		0.42	0.07	0.53		0.61	
NITRATE + NITRITE AS N	0.28		0.17		(0.20)	(0.2)	0.19		0.14	
AMMONIA (NH3 AS N)	0.06		0.06			0.04	0.07		0.05	
TOTAL PHOSPHATE (PO4)										
TRACE ELEMENTS										
ARSENIC (AS) DISS	0.002	(0.005	0.008	(0.001	0.024 *	0.004	0.004	0.010	0.007	0.004
BORON (B) DISS	(0.1	(0.1	(0.1	(0.1	(0.12 *	(0.1	(0.1	(0.1	(0.1	(0.1
CADMIUM (CD) DISS	0.009	(0.005	0.004	0.002	0.012 *	(0.001	(0.001	0.002	0.001	0.005
CHROMIUM (CR) DISS	(0.001	(0.02	(0.001		0.016 *	0.004	(0.001		(0.001	
COPPER (CU) DISS	0.025	(0.01	(0.001	(0.005	0.020 *	0.003	0.013	(0.005	0.002	(0.005
IRON (FE) DISS	0.021	(0.05	0.045	0.013	0.31 *	0.01	0.014	0.135	0.002	0.040
LEAD (PB) DISS	(0.002	(0.02	0.003	(0.010	0.029 *	(0.002	(0.002	(0.010	0.002	(0.002
MANGANESE (MN) DISS	0.25	0.05	0.25		0.11 *	0.001	0.035		0.48	
MERCURY (HG) DISS	(0.0005	(0.001	(0.0005		(0.0005 *	(0.0005	(0.0005		(0.0005	
SELENIUM (SE) DISS	0.003	(0.005	0.003		0.006 *	0.002	0.002		(0.002	
SILVER (AG) DISS	(0.001		(0.001		(0.001 *	(0.002	(0.001		(0.001	
ZINC (ZN) DISS	1.03	0.04	0.010	0.017	0.42 *	0.044	0.047	0.088	0.23	0.173
OTHER PARAMETERS										
CYANIDE (CN) TOTAL	(0.01		(0.01-			(0.01	(0.01		(0.01	

* Total recoverable.

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 11-24-1985
HUT-5/96-K1

SUMMARY OF GROUNDWATER QUALITY ANALYSIS - WECD CLARKTON

SITE NAME	WE-7	WE-9	WE-9	WE-9	WE-10	WE-10	WE-10	WE-10	WE-11	WE-11	WE-12
SAMPLE DATE LAB	09/09/86 NET	03/15/86 NET	07/21/86 NET	10/01/86 NET	03/15/86 NET	07/14/86 NET	10/02/86 NET	03/15/86 NET	10/01/86 NET	05/15/86 NET	
PHYSICAL PARAMETERS											
SPEC. COND. (UMHOS/CM) LAB	531	534	541	567	540	626	550	309	264	477	
PH LAB	6.9	6.9	7.1	6.9	7.1	7.7	7.1	7.5	7.4	7.7	
TDS MEAS. @ 180 DEG. C	424	352	356	404	362	392	456	106	152	280	
SODIUM ADSORPTION RATIO	0.24	0.39			0.30		0.42	0.54		0.70	
COMMON IONS											
TOTAL HARDNESS AS CaCO3	272	251	85	80	250	93	271	126	26	203	
CALCIUM (CA)	86	79			82		80	37		55	
MAGNESIUM (MG)	14	13			13		13	8		10	
SODIUM (NA)	9	14	10	14	14	22	16	14	10	23	
POTASSIUM (K)	11	2			1		2	1		2	
ACIDITY AS CaCO3	0	0			0		0	0		0	
ALKALINITY AS CaCO3 (LAB)	141	111	150	151	124	141	159	105	108	129	
BICARBONATE (HCO3) (LAB)	172	135	183		151	172	194	128		156	
CARBONATE AS CO3 (LAB)	0	0	0		0	0	0	0		0	
HYDROXIDE (OH)	0	0			0		0	0		0	
SULFATE (SO4)	154	154	153	128	145	153	125	37	19	104	
CHLORIDE (CL)	4	5			5		5	3		5	
FLUORIDE (F)	0.39	0.30			0.20		0.26	0.30		0.12	
NUTRIENTS											
NITRATE + NITRITE AS N	0.40	1.00			1.06		0.10	0.93		1.29	
ORTHOPHOSPHATE (PO4-P)	0.08				0.12		0.12			0.29	
AMMONIA (NH3 AS N)	0.2	0.31			0.23		0.2	0.32		0.04	
TOTAL PHOSPHATE (PD4)		0.06			0.05			0.05			
TRACE ELEMENTS											
ARSENIC (AS) DISS	0.072 *	0.010	0.009	0.022	0.007	0.005	0.006	0.004	0.001	0.004	
BORON (B) DISS	0.1 *	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
CADMIUM (CD) DISS	0.005 *	0.004	0.004	0.014	0.002	0.004	0.005	0.001	0.001	0.002	
CHROMIUM (CR) DISS	0.015 *	0.001			0.001		0.005	0.003	0.001	0.001	
COPPER (CU) DISS	0.008 *	0.010	0.012	0.005	0.002	0.008	0.005	0.001	0.005	0.003	
IRON (FE) DISS	0.67 *	0.012	0.031	0.158	0.023	0.009	0.005	0.017	0.010	0.014	
LEAD (PB) DISS	0.041 *	0.002	0.005	0.010	0.003	0.002	0.012	0.003	0.010	0.003	
MANGANESE (MN) DISS	2.50 *	0.005			0.008		0.017	0.007		0.009	
MERCURY (HG) DISS	0.0005 *	0.0005			0.0005		0.0005	0.0005		0.0005	
SELENIUM (SE) DISS	0.004 *	0.004			0.003		0.005	0.003		0.003	
SILVER (AG) DISS	0.005 *	0.001			0.001		0.002	0.001		0.001	
ZINC (ZN) DISS	0.20 *	0.305	0.201	0.241	0.040	0.175	0.078	0.010	0.021	0.013	
OTHER PARAMETERS											
CYANIDE (CN) TOTAL		0.01			0.01			0.01		0.01	
CYANIDE (CN)	0.005						0.005				

* Total recoverable.

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Report Date: 11-24-1986

WD-8/86-R1

SUMMARY OF GROUNDWATER QUALITY ANALYSIS - WECO CHARTER

SITE NAME	WE-12	WE-13	WE-13	WE-13	WE-14	WE-14	WE-14	WE-15	WE-15	WE-15	WE-16
SAMPLE DATE	07/17/86	05/14/86	07/17/86	10/03/86	05/14/86	07/21/86	10/03/86	05/14/86	07/19/86	04/21/86	
LAB	NET	NET	NET	NET	NET	NET	NET	NET	NET	LYNDES	
PHYSICAL PARAMETERS											
SPEC. COND. (UMHOS/CM) LAB	501	465	538	517	340	346	305	320	344	1250	
FIL LAB	7.9	7.7	8.0	7.5	7.0	7.0	7.6	7.7	8.0	7.2	
TDS MEAS. @ 180 DEG. C	322	286	304	340	208	202	216	104	174	1034	
SODIUM ADSORPTION RATIO		0.85		0.84	1.18			1.77			
COMMON IONS											
TOTAL HARDNESS AS CaCO3		192		169	115			77			
CALCIUM (CA)	70	62	70	53	36	37	37	24	26	719	
MAGNESIUM (MG)		9		9	6			4		37	
SODIUM (NA)	28	27	32	25	29	32	28	40	45	27	
POTASSIUM (K)		2		1	1			2		3.0	
ACIDITY AS CaCO3		0		0	0			0			
ALKALINITY AS CaCO3 (LAB)	135	122	126	128	122	126	126	119	120	170	
BICARBONATE (HCO3) (LAB)	165	149	154	156	149	154		144	146	207	
CARBONATE AS CO3 (LAB)	0	0	0	0	0	0		0	0	0	
HYDROXIDE (OH)		0		0	0			0			
SULFATE (SO4)	91	105	94	81	51	47	36	44	39	570	
CHLORIDE (CL)		5		5	3			2		14	
FLUORIDE (F)		0.14		0.15	0.15			0.15		0.21	
NUTRIENTS											
NITRATE (NO3-N)		1.16		0.85	1.02			0.87		1.0	
NITRATE + NITRITE AS N				0.1							
ORTHOPHOSPHATE (PO4-P)		0.20		0.2	0.32			0.32			
AMMONIA (NH3 AS N)		0.05			0.04			0.06			
TOTAL PHOSPHATE (PO4)											
TRACE ELEMENTS											
ARSENIC (AS) DISS	0.002	0.003	0.003	0.001	0.002	0.002	0.001	0.003	0.003	0.005	
BORON (B) DISS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
CADMIUM (CD) DISS	0.004	0.004	0.002	0.002	0.001	0.002	0.002	0.001	0.002	0.005	
CHROMIUM (CR) DISS		0.001		0.005	0.001			0.001		0.02	
COPPER (CU) DISS	0.005	0.001	0.005	0.005	0.001	0.007	0.005	0.002	0.005	0.01	
IRON (FE) DISS	0.005	0.028	0.005	0.047	0.028	0.010	0.020	0.117	0.005	0.10	
LEAD (PB) DISS	0.002	0.002	0.002	0.01	0.003	0.005	0.010	0.002	0.002	0.02	
MANGANESE (MN) DISS		0.020		0.08	0.013			0.005		0.18	
MERCURY (HG) DISS		0.005		0.008	0.0005			0.0005		0.001	
SELENIUM (SE) DISS		0.003		0.005	0.002			0.02		0.005	
SILVER (AG) DISS		0.001		0.002	0.001			0.001			
ZINC (ZN) DISS	0.057	0.025	0.031	0.018	0.059	0.031	0.009	0.009	0.035	0.30	
OTHER PARAMETERS											
CYANIDE (CN) TOTAL		0.01			0.01			0.01			
CYANIDE (CN)				0.005							

* Total recoverable.

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 11-24-1986
HWP-6/86-R1

SUMMARY OF GROUNDWATER QUALITY ANALYSIS - WEC0 C1A15AH

SITE NAME	WE-16 07/15/86 NET	WE-16 07/22/86 NET	WE-16 10/15/86 NET	III-1 07/22/86 NET	III-2 07/22/86 NET	DUPLICATE 07/23/86 NET	III-4 07/23/86 NET	TU-5 10/10/86 NET
PHYSICAL PARAMETERS								
SPHL. COND. (UMHDS/CM) LAB	988	1000	902	203	549	527	795	374
PIL LAB	7.4	7.7	7.4	7.9	7.5	7.5	7.8	7.8
TDS MEAS. @ 180 DEG. C	756	722	632	200	346	364	626	276
SODIUM ADSORPTION RATIO	0.45		0.34	1.08	1.08	0.57	0.51	0.77
COMMON IONS								
TOTAL HARDNESS AS CaCO ₃	539		464	117	244	257	434	140
CALCIUM (Ca)	170	143	143	37	79	80	147	46
MAGNESIUM (MG)	28	26	26	6	14	14	21	6
SODIUM (NA)	24	27	17	27	21	21	25	21
POTASSIUM (K)	2		2	2	2	2	2	2
ACIDITY AS CaCO ₃	0		0	0	0	0	0	0
ALKALINITY AS CaCO ₃ (LAB)	154	168	168	122	136	140	137	112
BICARBONATE (HCO ₃) (LAB)	188	205	205	149	149	171	157	137
CARBONATE AS CO ₃ (LAB)	0	0	0	0	0	0	0	0
HYDROXIDE (OH)	0		0	0	0	0	0	0
SULFATE (SO ₄)	394	335	318	33	142	143	326	89
CHLORIDE (CL)	12		10	6	8	8	12	4
FLUORIDE (F)	0.32		0.30	0.22	0.20	0.23	0.14	0.21
ANIONS								
NITRATE + NITRITE AS N	1.59		0.96	0.21	0.31	0.39	0.60	0.13
ORTHOPHOSPHATE (PO ₄ -P)			0.09					0.12
AMMONIA (NH ₃ AS N)	0.29		0.2	0.2	0.2	0.2	0.2	0.2
TOTAL PHOSPHATE (PO ₄)	0.04			0.07	0.16	0.11	0.11	
TRACE ELEMENTS								
ARSENIC (AS) DISS	0.004	<0.002	0.004	<0.002	0.002	<0.002	0.002	<0.001
BORON (B) DISS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
CADMIUM (CD) DISS	0.002	0.002	0.003	0.002	0.004	0.004	0.004	0.006
CHROMIUM (CR) DISS	0.008		<0.005	<0.005	<0.005	0.007	0.008	<0.005
COPPER (CU) DISS	0.003	0.021	<0.005	<0.005	0.040	0.010	0.027	<0.005
IRON (FE) DISS	0.040	0.215	0.188	0.051	0.016	<0.010	0.031	0.053
LEAD (PB) DISS	0.003	<0.005	0.012	<0.005	0.005	<0.005	<0.005	<0.010
MANGANESE (MH) DISS	0.020		0.017	<0.005	0.028	0.036	0.082	<0.010
MERCURY (UG) DISS	<0.0005		0.0004	<0.010	<0.0005	<0.0005	<0.005	<0.0005
SELENIUM (SE) DISS	0.002		<0.001	<0.001	<0.001	0.001	<0.001	0.003
SILVER (AG) DISS	<0.001		0.010	<0.002	<0.002	0.001	<0.002	<0.002
ZINC (ZN) DISS	0.015	0.046	0.022	0.003	0.004	0.003	0.041	0.004
OTHER PARAMETERS								
CYANIDE (CN) TOTAL	<0.01		<0.005	0.007	<0.005		<0.005	<0.003
CYANIDE (CN)								

Total recoverable.

quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Docproc Date: 11-24-1984
1000-5/96-K1

SUMMARY OF PRIVATE WELL GROUNDWATER QUALITY ANALYSIS - WECO CHARTAM

SITE NAME	FW-2	FW-3	FW-4	FW-4	FW-4
SAMPLE DATE	04/22/85	09/08/82	04/17/81	09/08/82	02/12/85
LAB	LYNDES	QOH	MMHC	QOH	NET
PHYSICAL PARAMETERS					
SPEC. COND. (UMHOS/CM) LAB	640	851.0		1432.0	2680
PH LAB	7.3	7.62		7.29	6.9
TOTAL SUSP. SOLIDS					28
TDS REAS. @ 180 DEG. C	456				2010
SODIUM ADSORPTION RATIO			0.40		0.31
COMPOUNDS					
TOTAL HARDNESS AS CaCO3	321		608.60		1957
CALCIUM (CA)	102		213		590
MAGNESIUM (MG)	16		30.1		113
SODIUM (NA)	15		24.2		32
POTASSIUM (K)	1.0		2.9		5
ALCALINITY AS CaCO3 (LAB)	159				457
BICARBONATE (HCO3) (LAB)	194				550
CARBONATE AS CO3 (LAB)	0				0
HYDROXIDE (OH)					0
SULFATE (SO4)	179				1600
CHLORIDE (CL)	8				10
FLUORIDE (F)	0.20				0.29
NUTRIENTS					
NITRATE (NO3-N)	0.65				0.28
NITRATE + NITRITE AS N					0
ORTHOPHOSPHATE (PO4-P)					0.20
AMMONIA (NH3 AS N)					
TRACE ELEMENTS					
ALUMINIUM (AL) DISS			0.27		
ARSENIC (AS) DISS	(0.005	0.013	0.986	0.66	0.037
ARSENIC (AS) TOTAL REC.			0.13		
BORON (B) DISS	0.1				0.1
BORON (B) TOTAL REC.					
CADMIUM (CD) DISS	(0.005		0.01	(0.005	0.012
CADMIUM (CD) TOTAL REC.					
CHROMIUM (CK) DISS	(0.02	0.005	0.02		0.039
CHROMIUM (CK) TOTAL REC.					
COFFER (CU) DISS	0.01		0.08	0.01	0.037
COFFER (CU) TOTAL REC.					
IRON (FE) DISS	(0.05	0.02			
IRON (FE) TOTAL REC.			3.92	3.46	21.0
LEAD (PB) DISS	(0.02	0.99	0.11		
LEAD (PB) TOTAL REC.					0.071

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested. Output Date: 11-21-1996
 1000-6/86-R1

SUMMARY OF PRIVATE WELL GROUNDWATER QUALITY ANALYSIS - WECU CINETAN

SITE NAME	FU-2	FU-3	FU-4	FU-4	FU-4
SAMPLE DATE	04/22/85	09/08/85	04/17/81	04/08/82	02/12/84
TRACE ELEMENTS					
LITHIUM (LI) DISS					
MANGANESE (MN) DISS	0.02		0.03		
MANGANESE (MN) TOTAL REC.			3.24		
MERCURY (HG) DISS	0.001				12.1
MERCURY (HG) TOTAL REC.					(0.0005
NICKEL (NI) DISS			0.20		
NICKEL (NI) TOTAL REC.			0.02		
SELENIUM (SE) DISS	0.005				(0.005
SELENIUM (SE) TOTAL REC.					(0.001
SILVER (AG) DISS			0.04		
SILVER (AG) TOTAL REC.					
STRONTIUM (SR) DISS			2.52		
TITANIUM (TI) DISS			0.04		
VANADIUM (V) DISS			0.04		
ZINC (ZN) DISS	0.12	1.13	8.00	5.22	40.3
ZINC (ZN) TOTAL REC.					
OTHER PARAMETERS					
SILICA (SI02)			20.4		

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 11-21-1984
100-2/03-K1

SUMMARY OF SPRING WATER QUALITY ANALYSIS - WECO CHARTAM

SITE NAME	SP-2	SP-3	SP-4	SP-5	SP-6	SP-7	SP-8	SP-8	SP-10	SP-11
SAMPLE DATE	02/19/85	07/08/86	07/10/86	02/19/85	05/28/85	05/20/85	05/28/85	07/11/86	05/28/85	07/08/86
LAB	LYNDES	NET	NET	LYNDES	LYNDES	LYNDES	LYNDES	NET	LYNDES	WHD
PHYSICAL PARAMETERS										
WATER TEMPERATURE (C)	7.0	27.6	20.6	33.0	10.5	11.6	9.7	43.6	45.0	0.12
SPEC. FLOW. (LIMBS/CH) LAB	290	0.0	7.4	6.6	310	400	450	7.6	450	691.0
PH LAB	7.2	29	454	236	7.1	6.7	6.0	4	6.8	7.91
TOTAL SUSP. SOLIDS	200	185	275	236	194	240	266	266	270	
TDS MEAS. @ 180 DEG. C		0.44	0.41					0.44		
SODIUM ADSORPTION RATIO										
COMMON IONS										
TOTAL HARDNESS AS CaCO3	134	120	75	158	140	190	212	100	201	
CALCIUM (Ca)	42	30	20	50	30	53	62	54	59	
MAGNESIUM (Mg)	7	6	6	0	11	16	14	13	13	
SODIUM (Na)	12	11	0	13	13	14	15	14	15	
POTASSIUM (K)	1	1	2	2	1	1	1	1	1	
ACIDITY AS CaCO3		0	0					0		
ALKALINITY AS CaCO3 (LAB)	120	124	77	124	119	171	166	163	160	
BICARBONATE (HCO3) (LAB)	146	151	94	151	145	209	203	223	220	
LACONATE AS CO3 (LAB)	0	0	0	0	0	0	0	0	0	
HYDROXIDE (OH)		0	0					0		
SULFATE (SO4)	34	24	10	55	30	33	39	26	39	
CHLORIDE (Cl)	2	4	7	2	9	0	23	0	9	
FLUORIDE (F)	0.26	0.19	0.11	0.30	0.24	0.27	0.20	0.31	0.26	
NUTRIENTS										
NITRATE (NO3-N)	0.72	0.22	0.97	0.23	1.00	2.44	1.00	0.72	0.40	
NITRATE + NITRITE AS N		0.2	0.25					0.2		
AMMONIA (NH3 AS N)		0.19	0.47					0.07		
TOTAL PHOSPHATE (PO4)										
TRACE ELEMENTS										
ARSENIC (AS) TOTAL REC.		0.004	0.012		0.005	0.005	0.005	0.002	0.005	0.012
BORON (B) TOTAL REC.	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
CADMIUM (Cd) TOTAL REC.	0.005	0.001	0.004	0.005	0.005	0.005	0.005	0.002	0.005	
CHROMIUM (CR) TOTAL REC.	0.02	0.002	0.007	0.02	0.02	0.02	0.02	0.003	0.02	
COPPER (CU) TOTAL REC.	0.01	0.010	0.011	0.04	0.01	0.01	0.01	0.005	0.01	
IRON (FE) TOTAL REC.	1.23	0.360	2.20	1.79	0.05	2.34	0.09	0.059	0.05	
LEAD (PB) TOTAL REC.	0.02	0.002	0.003	0.02	0.02	0.02	0.02	0.002	0.02	
MANGANESE (MN) TOTAL REC.	0.06	0.021	0.282	0.24	0.01	0.13	0.01	0.007	0.01	
MERCURY (HG) TOTAL REC.	0.001	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005	0.001	
SELENIUM (SE) TOTAL REC.	0.005	0.002	0.005	0.005	0.005	0.005	0.005	0.002	0.005	
SILVER (AG) TOTAL REC.		0.002	0.002					0.002		
ZINC (ZN) TOTAL REC.	0.05	0.017	0.034	0.27	0.01	0.05	0.11	0.009	0.01	

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 11-21-1986
HNO-6/86-K1

SUMMARY OF SPRING WATER QUALITY ANALYSIS - WECO QUANTON

SITE NAME	SP-13	SP-16	BLANK
SAMPLE DATE	02/20/85	07/08/86	05/13/85
LAB	LYHDES	NET	NET
PHYSICAL PARAMETERS			
WATER TEMPERATURE (C)	9.7	37.1	15
SPEC. COND. (UMHDS/CM) LAB	450	0.1	6.0
PH LAB	6.8		
TOTAL SUSP. SOLIDS	24		15
TDS MEAS. @ 180 DEG. C	253		23
SODIUM ADSORPTION RATIO	0.48		0.16
COMMON IONS			
TOTAL HARDNESS AS CaCO3	212	163	0
CALCIUM (CA)	62	52	(1)
MAGNESIUM (MG)	14	8	(1)
SODIUM (NA)	15	14	(1)
POTASSIUM (K)	1	1	(1)
ACIDITY AS CaCO3	0	0	(1)
ALKALINITY AS CaCO3 (LAB)	166	158	(1)
BICARBONATE (HCO3) (LAB)	203	193	0
CARBONATE AS CO3 (LAB)	0	0	0
HYDROXIDE (OH)		0	0
SULFATE (SO4)	38	31	1
CHLORIDE (CL)	23	6	(1)
FLUORIDE (F)	0.28	0.22	(0.1)
NUTRIENTS			
NITRATE + NITRITE AS N	1.00		0.97
AMMONIA (NH3 AS N)		0.64	(0.2)
TOTAL PHOSPHATE (PO4)		0.09	(0.02)
TRACE ELEMENTS			
ARSENIC (AS) TOTAL REC.	(0.005)	0.002	(0.001)
BORON (B) TOTAL REC.	(0.1)	0.1	0.1
CADMIUM (CD) TOTAL REC.	(0.005)	0.006	(0.001)
CHROMIUM (CR) TOTAL REC.	(0.02)	(0.002)	0.004
COPPER (CU) TOTAL REC.	(0.01)	(0.005)	0.006
IRON (FE) TOTAL REC.	0.09	0.005	0.014
LEAD (PB) TOTAL REC.	(0.02)	0.002	(0.002)
MANGANESE (MN) TOTAL REC.	(0.01)	0.015	(0.001)
MERCURY (HG) TOTAL REC.	(0.001)	(0.0005)	(0.0005)
SELENIUM (SE) TOTAL REC.	(0.005)	(0.002)	(0.002)
SILVER (AG) TOTAL REC.		(0.002)	0.007
ZINC (ZN) TOTAL REC.	0.11	0.032	(0.01)
OTHER PARAMETERS			
CYANIDE (CN) TOTAL			(0.01)

All quantities in milligrams per liter unless otherwise noted. Blank line indicates parameter not tested.

Output Date: 11-21-1986
1000-6/85-K1

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**CHARTAM
PA NO. 04-501**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Chartam
04-501

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 10.527
6	GW - TARGETS	WELLS - 1 MI. x 2.5	30.0
7		WELLS - 1 TO 4 MI	81
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 111.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 233699
SURFACE WATER PATHWAY			
11		OBSERVED RELEASE	300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES	100
13A		CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 11.117
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	10
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 18
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 160085
AIR PATHWAY			
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	5
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 25
27		LIKELIHOOD SCORE	LINES 25 + 26C 25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.543
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31		WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 40
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 543
DIRECT CONTACT PATHWAY			
36		OBSERVED EXPOSURE	200
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	10
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 50
38		LIKELIHOOD SCORE	LINES 36 + 37C 250
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.516
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	1
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	0
43		TARGETS SCORE	SUM LINES 40 THRU 42 1
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 129
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000		3.94

SITE NAME:
PA NUMBER:

Chartam
04-501

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	150
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	265
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	2.65



04-501, #16: SW-2 sample location



04-501, #17: Top of WR-3 (graded)



04-501, #18: WR-3 proximity to Iron Age Gulch



04-501, #19: WR-1 from west



04-501, #20: Open pit (Edna Claim) with highwall



04-501, #21: East half of WR-2



04-501, #22: Center of WR-2 with adits



04-501, #23: West half of WR-2 with buildings and stream

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: BROADWATER PA#: 07-079

Date: July 12, 1994 Time: 0800-1400

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Bisch, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Cool; clear in morning; breezy
and cloudy in afternoon.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: Seep at bottom
of WR-2; #2: WR-2 from below facing north; #3: WR-2 from below
facing south; #4: SW-1 sample location from below facing east; #27:
Adit #1. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Large volume of waste rock; few sulfides, very steep. Adit
discharge has good pH.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Very large
and steep disturbed area will be costly to reclaim. Adit discharge
should be routed around dump instead of seeping through it.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BROADWATER PA#: 07-079

Legal Description: T 14N ; R 8E ; Sec. 32 , NE 1/4 SE 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 03" Longitude: W 110° 43' 27"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Belt Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Gold, Silver, Copper, Lead, Zinc

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y X N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Peter Antonoli, Butte, MT.

Relationship to other mines/sites in the area/district: South of Hartley and Moulton; southwest of Silver Belt and Dakotah mines.

Regulatory Status (Activity by other agencies)? Hardrock permits?

Past Reclamation Activities? N/A

General site features: Elevation 6200' , Slope 36° , Aspect Southwest

Land use: Mining , Recreational X , Residential , Urban , Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? Approx. 14 acre(s) .

Site Dimensions: 1,000 feet x 500 feet

Predominant vegetation types: Lodgepole pine, spruce, willows

Access: roads - good (paved) , poor (maintained dirt road) , 4wd X , trail .

Other logistical considerations (proximity to other sites) .

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There is 1
well reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also
note presence of radioactive minerals). The site is underlain by Pre-Cambrian
gneisses and schists. Unnamed tributary, 0-0.25 miles; Belt Creek,
0.25-15 miles.

Mining/milling history, ore type/tenor, host rock, gangue: The
claims were located in 1881. Fairly steady production was reported
from 1897 to 1922, and again from 1940 to 1949. Tenor was 40 to 60
oz/ton silver; 7 to 8% lead; 20% zinc. As in most of the district,
galena, sphalerite, and pyrite were the most abundant sulfide
minerals. Barite, rhodochrosite and quartz were common gangue
minerals.

Mine Operation?

Shafts - Yes X, No , # 1, Comment Caved
Adits - Yes X, No , # 1, Comment Discharging
Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes , No X, # , Comment

Mill Operation? Yes , No X. If yes answer the next three
questions:

Period(s) of Operation: Literature mentions a mill; however, no
evidence of a mill was found at the site (possibly off-site or in
Neihart).

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and
names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

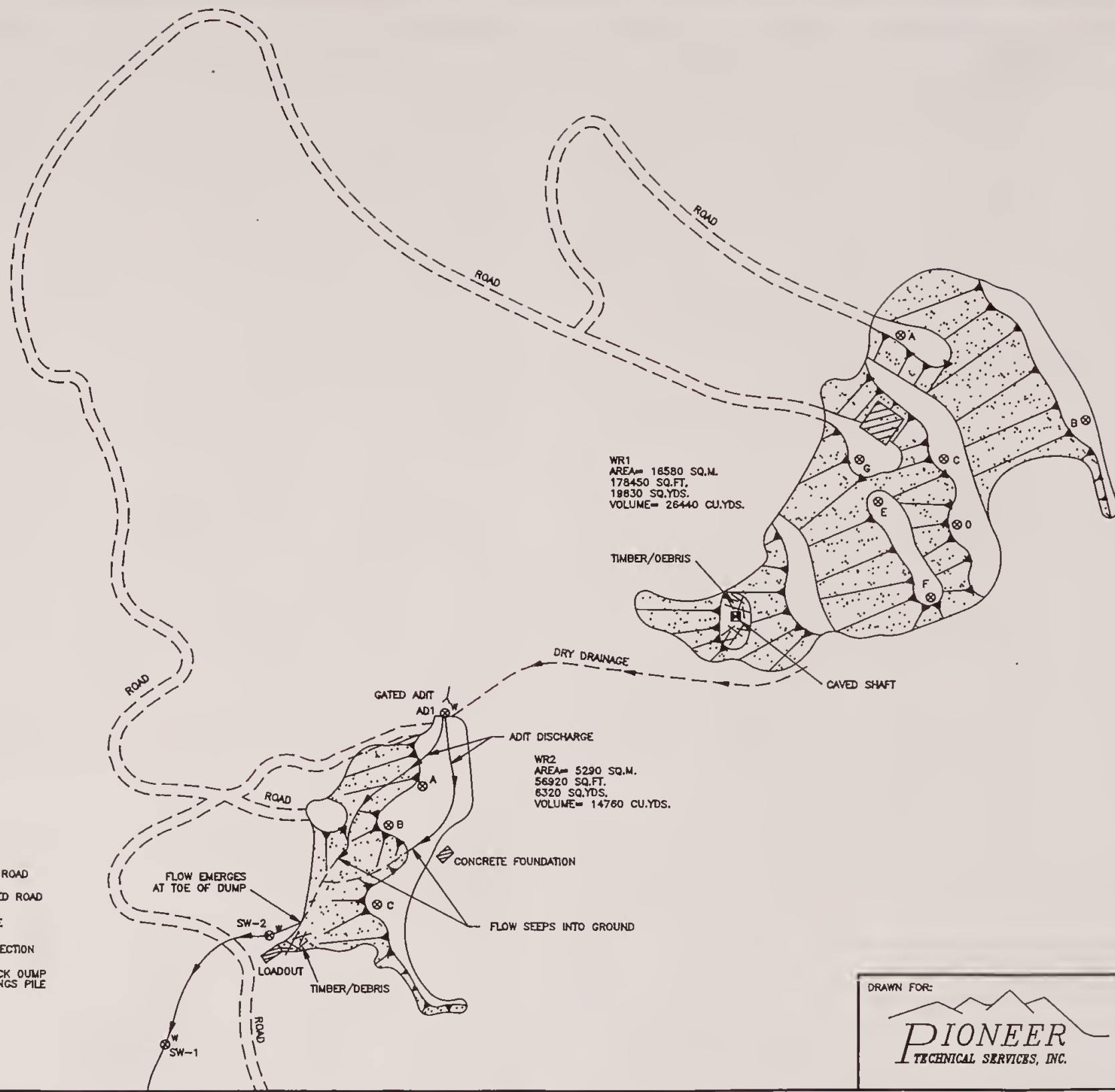
Well No.	Location	Depth	Yield	Static Water Level
25649	14N 08E 32 BDC	120.0	8.0	7.00



BROADWATER, P.A. NO. 07-079

T14N, P08E, SECTION 32

SCALE 1" = 1000'



CAVED SHAFT

WR2
AREA= 5290 SQ.M.
56920 SQ.FT.
6320 SQ.YDS.
VOLUME= 14760 CU.YDS.

CONCRETE FOUNDATION













FLOW SEEPS INTO GROUND

FLOW EMERGES
AT TOE OF DUMP

LOADOUT

TIMBER/DEBRIS

SW-1

	XRF SAMPLE		IMPROVED ROAD
	WATER SAMPLE		UNIMPROVED ROAD
	GROUND AND SURFACE		
	OPEN ADIT		STRUCTURE
	COLLAPSED ADIT		SLOPE DIRECTION
	DRAINAGE		WASTE ROCK DUMP OR TAILINGS PILE
	DRY DRAINAGE		
	TIMBER		

DRAWN FOR:



PIONEER
TECHNICAL SERVICES, INC.

TITLE:

BROADWATER
PA# 07-079

DRAWING NO.: PT340253
DATE: 11/8/94

REV: -
PLOT SCALE: 1 = 50

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	pH SU (D/S)	RADIO-ACTIVITY (MR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	26,440	Top, northwest side of upper dump	None	5.8 (D)	0.05	07-079-WR-1	07/12/94 1145	T-Metals, ABA
WR-1B	WR		Top, southeast side of upper dump	None	6.2 (D)	0.06			
WR-1C	WR		Northwest side on second level of upper dump	None	5.2 (D)	0.045			
WR-1D	WR		Southeast side on second level of upper dump	None	5.7 (D)	0.05			
WR-1E	WR		Northwest side on third level of upper dump	None	5.6 (D)	0.06			
WR-1F	WR		Southeast side on third level of upper dump	None	5.2 (D)	0.04			
WR-1G	WR		Middle on lower level of upper dump	None	5.2 (D)	0.03			
WR-2A	WR	14,760	Northwest side of lower dump	None	5.2 (D)	0.03	07-079-WR-2	07/12/94 1200	T-Metals, ABA
WR-2B	WR		Center of lower dump	None	5.7 (D)	0.04			
WR-2C	WR		Southeast side of lower dump	None	4.2 (D)	0.04			

D-Direct reading (calvery Meter) ; B-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-079-WR-1 is composite of WR-1A through -1G. 07-079-WR-2 is composite of WR-2A through -2C. See Ripple Mines (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 1 Identification: AD-1

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes X, No , Number: 1 Identification: SW-2 seep
from base of WR-2

Groundwater wells within 4 miles?: Yes X, No ;
Number of well logs: 6

Distance to nearest well used for drinking:
 <1,000 ft; X 1,000 ft to 0.5 miles; >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Shallow groundwater; large uncontained source with high metals
concentrations.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: N/A

SAMPLERS: Tuesday, Bisch

NOTE: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): :

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Unnamed drainage below mine

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes X, No , Name(s)/Description: Adit discharge

Waste materials within any floodplain: Yes X, No Source ID(s): WR-2 dump materials are in drainage.

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 10 gpm

High Flow: 80 gpm, Average Flow: 8 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; WR-2 in drainage.

Surface water draining onto or through waste sources: Yes X, No , Describe: Adit discharges onto WR-2.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Agriculture; possible irrigation and fishery (Belt Creek)

Observed erosional/sedimentation/stream turbidity problems? Yes X, No . Distance downstream (ft)? 0-500 X; 500-1,000 ; >1,000 . Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Dump material in streambed 200 feet downstream.

SAMPLERS: Tuesday

[illegible]

:(H) pəɪntɪŋ zə (ə) pəʃtɪʃɪz : bɒl

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Small area (1/4 acre) on top of WR-2 could be used to treat adit discharge.

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; X 1,000 ft - 0.5 miles; ___>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:

observed high moderate low none

SAMPLERS: Tuesday

[illegible]

Notes and Clarifications: Adit discharge ponds on top of WR-2, wetting approximately 10 percent of the area.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10____; 10-30____; 30-100 X; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes X, No____, Describe: Litter;
campfire rings; gun shell casings.

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage____; Secondary Drainage X; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium____, Low X

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 1, types and locations:____
Open adit fenced with an unsecured piece of chain-link fence.

Hazardous structures: Yes X, No____, Number 2, types and locations:____
Leaning loadouts at upper and lower dumps

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 2, types and locations: WR-1 and WR-2 are extremely steep, and
WR-1 is at greater than angle of repose.

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

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- MBMG, Mining in Cascade County, General Geology, Written by Frank A. Crowley, Acting Head, Minerals Branch, Date Unknown.
- MBMG, Well Log Database, July 14, 1994.
- MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.
- MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Broadwater Mine, Prepared by Daphne Diggrindakis, October 16, 1985.
- USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.
- USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**BROADWATER
PA NO. 07-079**

Broadwater P-A# 07-079
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/12/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-079-WR1	92.8 JX	224 J	599	28.7	13.4	10.8	105	28300	0.52 J	8700	14.8	7420	23.3 J	5710	NR
07-079-WR2	34.8 JX	174 J	683	25.8	27.0	38.0	58.1	42600	1.09 J	10600	45.6	4380	14.3 J	5360	NR
BACKGROUND	0.5 B	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		SULFATE		PYRITIC SULFUR		ORGANIC SULFUR		PYRITIC SULFUR ACID BASE POTENT.		SULFUR ACID BASE POTENT.	
	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t	%	1/1000t
07-079-WR1	0.93	29.1	11.7	-17	0.38	0.07	0.48	2.19	9.53							
07-079-WR2	0.62	19.4	30.0	10.6	0.20	0.12	0.30	3.75	26.2							

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
07-079-AD1	0.12 U	1.9 B	2.8 B	20.2 J	8.7 U	4.7 U	4.6 U	99.9 B	0.08 U	3030	99.4	3.1	46.0 B	15400	489
07-079-SW1	0.12 U	1.5 B	30.5 B	14.5 J	8.7 U	4.7 U	4.6 U	128	0.08 U	48.7	13.6 B	15.5	29.4 U	4830	376

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-079-AD1	690	<5	472	<0.05	NR
07-079-SW1	521	<5	322	<0.05	NR

LEGEND

WR1 - Composite of subsamples WR1A through 1G.
 WR2 - Composite of subsamples WR2A through 2C.
 BACKGROUND - From the Apple Mine (07163-S31).

AD1 - Discharge from lower side on WR2.
 SW1 - Downstream of mine dumps in unmined drainage.

XRF ANALYSIS RESULTS

**BROADWATER
PA NO. 07-079**

Mine Name: Broadwater PA# 07-079
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-079-WR1A	27668.1	27797.3	5289.1	2419.81		18760.7	35181.3			205.216 *	4765.44		63.6298
07-079-WR1B	22210.4	29776.6	1792.42	1566.62		3818.62	29755.2			91.0645 *	1231.47		47.7166
07-079-WR1C	24957.9	21098.2	4544.19	2607.91		15100	37341			122.258 *	2749.93		119.068
07-079-WR1D	22437.7	27660.4	2970.02	3107.18		466.988 *	24454.3				3209.58		28.7895 *
07-079-WR1E	16326.8	22293.4	3571.52	2092.67		17044.3	32974			109.992 *	2651.68		118.446
07-079-WR1F	10897.7	16144.6	3607.67	2206.67		11476.7	31393.6				3585.44		64.1364
07-079-WR1G	16326.8	22293.4	3267.88	2309.01		13292.1	31634.5			162.283 *	3350.09		141.252
07-079-WR1-COMP	16326.8	22293.4	4677.96	2253.03		10482.9	33103.8			123.471 *	3567.16		81.5278
07-079-WR2A	10897.7	16144.6	5353.64	1978.18		17647.7	41087.9			111.505 *	3579.52		110.428
07-079-WR2B	10897.7	16144.6	5891.92	2134.98		9608.47	41971.2			80.267 *	3597.85		77.1848
07-079-WR2C	10897.7	16144.6	12448.2	4026.72	253.906 *	10932	51349.3				3018.03		286.488
07-079-WR2-COMP	10897.7	16144.6	9762.01	3294.07		13255.7	50785.9			104.39 *	3568.94		188.183

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-079-WR1A	163.799			6959.74	154.375				2898.9	149.703 *		
07-079-WR1B	103.213			2802	156.457				700.767			
07-079-WR1C	166.411			4384.82	124.566				847.564		21.4331 *	
07-079-WR1D	105.343			2875.26	203.168				240.189		16.4827 *	17.0656 *
07-079-WR1E	156.199			5020.32	123.444			64.059 *	1325.13	151.431 *	23.1077 *	
07-079-WR1F	134.112			4201.04	125.068			59.2729 *	782.008	90.1977 *	19.6669 *	23.2393 *
07-079-WR1G	171.341			5010.03	118.606			66.4811 *	3223.16	215.35 *	21.0362 *	
07-079-WR1-COMP	142.427			4276.76	177.601			83.1018 *	1325.72			
07-079-WR2A	174.133		11.0757 *	4628.2	78.7147 *			69.9732 *	1728.34	137.562 *	16.5906 *	
07-079-WR2B	141.64		10.8149 *	1818.59	128.912				998.85			
07-079-WR2C	112.677			611.718	63.5613 *				381.18			
07-079-WR2-COMP	141.31			2353.23	90.1507 *		180.258 *		833.419		17.11 *	

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**BROADWATER
PA NO. 07-079**

AIMSS SCORESHEET

SITE NAME:

Broadwater

PA NUMBER:

07-079

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6			133.809
7	GW - TARGETS	WELLS - 1 MI. x 2.5	2.5
8		WELLS - 1 TO 4 MI	5
9		NEAREST WELL	5
10		TARGETS SCORE	LINES 6 + 7 + 8
		GROUNDWATER SCORE	LINES 4 x 5 x 9
			669045
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD	EXCEEDENCES	100
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16			147.589
17		DRINKING WATER POP'N	0
18		IMPACTED DRAINAGE	0
19	SW - TARGETS	WETLANDS	0
20		FISHERY	1
21		RECREATION	0
22		IRRIGATION/STOCK	2
23		T & E SPECIES HABITAT	0
24		TARGETS SCORE	SUM LINES 16 THRU 22
		SURFACE WATER SCORE	LINES 14 x 15 x 23
			221384
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	10
26B	OF RELEASE	DISTANCE TO POPULATION	10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29			9.558
30		POPULATION - 4 MILES	30
31	AIR - TARGETS	NEAREST RESIDENCE	5
32		WETLANDS	0
33		PARKS / WILDERNESS	0
34		T & E SPECIES HABITAT	0
35		TARGETS SCORE	SUM LINES 29 THRU 33
		AIR PATHWAY SCORE	LINES 27 x 28 x 34
			33453
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF	ACCESSIBILITY	20
37B	EXPOSURE	DISTANCE TO POPULATION	10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40			8.660
41	DIRECT CONTACT	POPULATION - 1 MILE	30
42	TARGETS	NEAREST RESIDENCE	5
43		RECREATIONAL USE	5
44		TARGETS SCORE	SUM LINES 40 THRU 42
		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
			86600
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		10.10

LINE
NO.

SITE NAME:
PA NUMBER:

Broadwater
07-079

SITE SAFETY

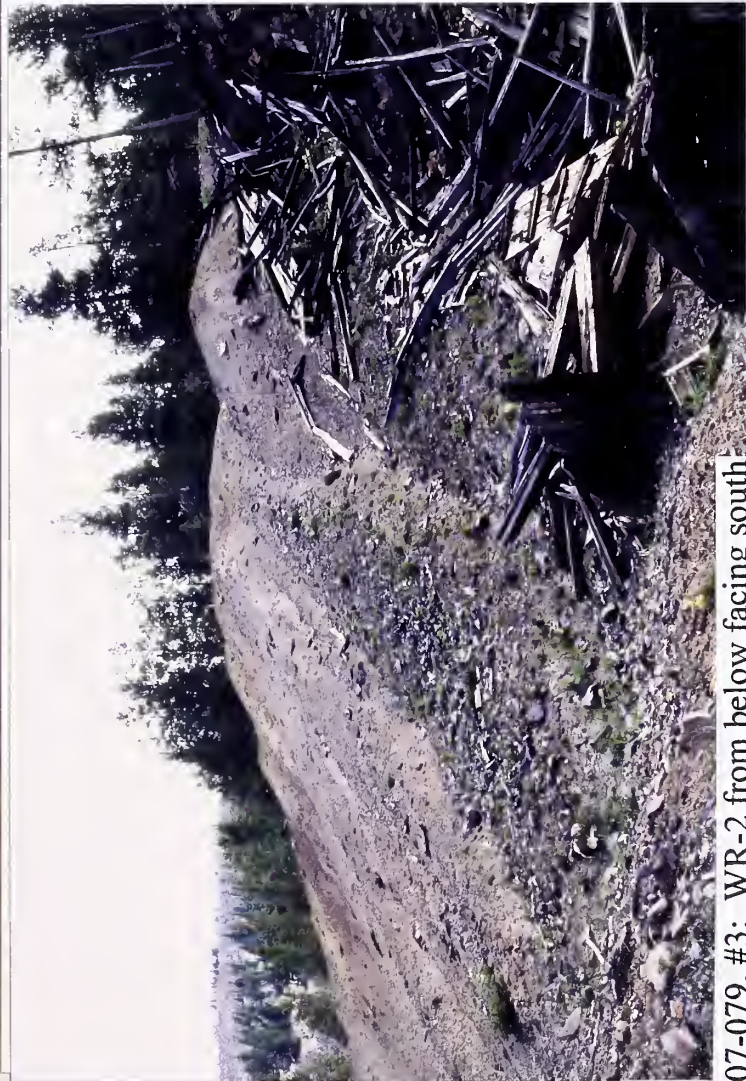
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	130
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	40
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	104.00



07-079, #1: Seep at bottom of WR-2



07-079, #2: WR-2 from below facing north



07-079, #3: WR-2 from below facing south



07-079, #4: SW-1 sample location from below facing east



07-079, #27: Adit #1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: HARTLEY PA#: 07-082

Date: June 8, 1994 Time: 0830-1100

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Snowing; cold; cloudy; snow
blowing to the northwest.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #19: WR-1; #20: WR-
2; #21: WR-3; #22: WR-4; #23: WR-5; #24: Collapsed wooden mill;
#26: Facing west at tailings and down Compromise Gulch.
Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): No
adit discharge, but water emanates from bottom of lower dump
(WR-4) and forms flow in Compromise Gulch (may be from adits).

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Move tailings
and waste rock out of drainage. Revegetation will be difficult due
to large rocks on most dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): HARTLEY PA#: 07-082

Legal Description: T 14N ; R 8E ; Sec. 32 , NE 1/4 NE 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 17" Longitude: W 110° 43' 41"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Compromise Gulch

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y X N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Neihart Consolidated Silver Mining Co., leased by Peter Antonoli, Butte, MT.

Relationship to other mines/sites in the area/district: 1,200 feet northwest of Broadwater mine; right next to the Atlantus mine, which was owned by the same operating company; veins on Rochester claim are thought to extend onto the Hartley.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 6200' , Slope 25° ,
Aspect Southwestern

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 2.75 acre(s) .

Site Dimensions: Approximately 400 feet x 300 feet

Predominant vegetation types: Lodgepole pine/Douglas fir forest; willow, shrubs, and grasses in Compromise Gulch.

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites).
Atlantus is adjacent; Broadwater in next drainage south; Moulton to the west in next drainage north.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There is 1
well reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also
note presence of radioactive minerals). Site is underlain by Precambrian gneiss.
The site lies in Compromise Gulch, which flows southwest away from
the site. Compromise Gulch flows into Belt Creek approximately 1/3
mile southwest of the site. Belt Creek flows northwest from the
confluence.

Mining/milling history, ore type/tenor, host rock, gangue:
Property was located in 1883 and shipments of ore began in 1901.
Mine has been idle since 1940. Production from 1901 through 1940
inclusive is reported at 164.04 oz. gold, 1,535,426 oz. silver,
10,028 lbs. copper, 3,894,765 lbs. lead, and 3,000 lbs. zinc from
64,423 tons of ore. The vein minerals are chiefly galena,
sphalerite, and pyrite in a gangue of quartz, ankerite, and barite.

Mine Operation?

Shafts - Yes , No X, # , Comment
Adits - Yes X, No , # 3, Comment Caved
Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes X, No , # 2, Comment Stopes (not located
during this investigation)

Mill Operation? Yes X, No . If yes answer the next three
questions:

Period(s) of Operation: 1928 to 1940; a small mill is reported
present in 1928; a 35-ton floatation plant is reported present in
1939.

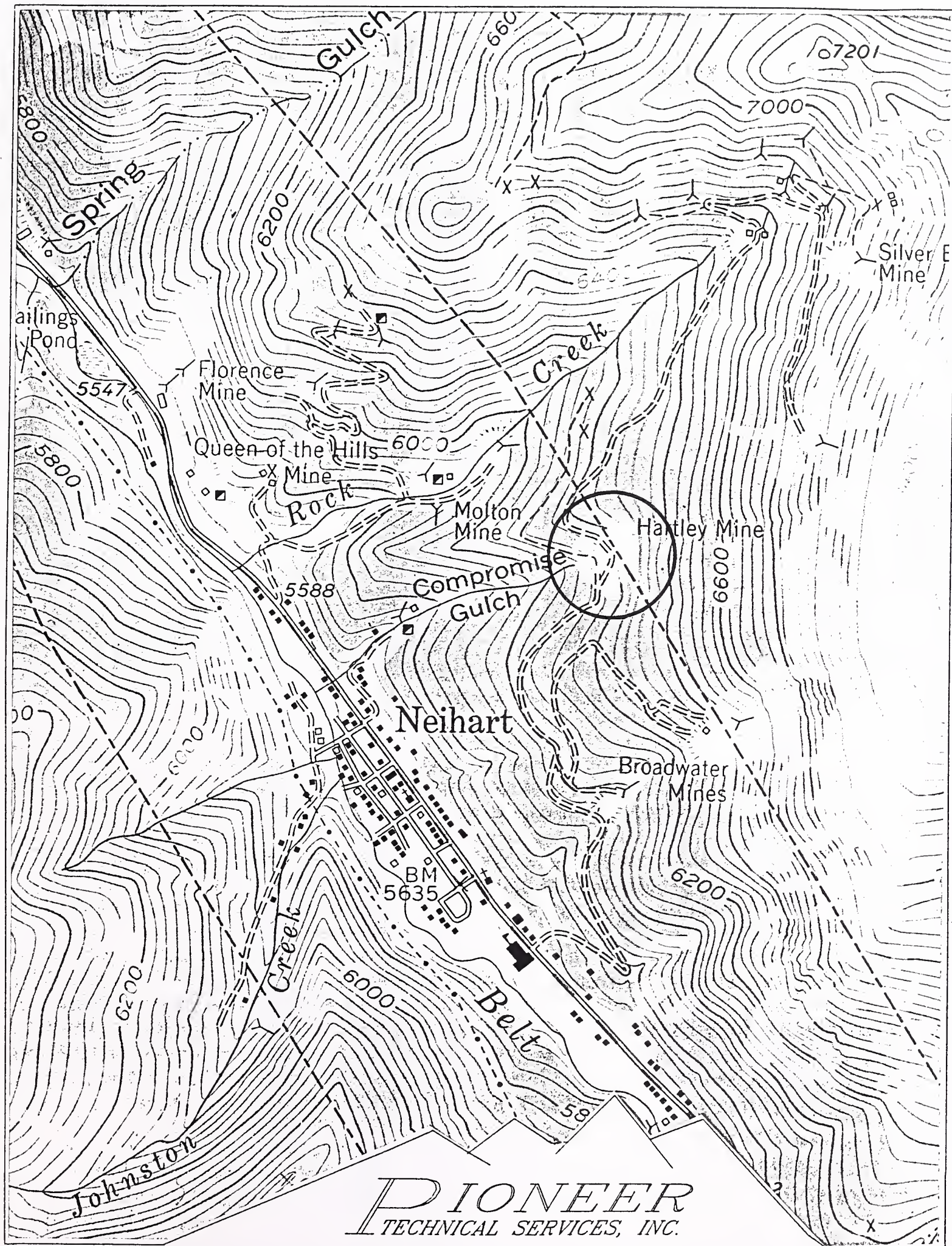
Origin of Ore Milled - Custom Mill Dedicated Mill X; Number and
names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
40-ton floatation mill (very small amount of tailings)

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

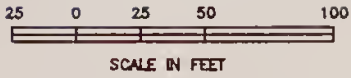
Well No.	Location	Depth	Yield	Static Water Level
25649	14N 08E 32 BDC	120.0	8.0	7.00



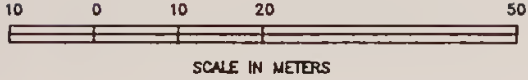
HARTLEY, P.A. NO. 07-082

T14N, R08E, SECTION 29

SCALE: 1" = 1000'



SCALE IN FEET



SCALE IN METERS

WR1
TOTAL AREA= 3280 SQ.M.
35270 SQ.FT.
3920 SQ.YDS.
VOLUME= 6530 CU. YDS.

WR4
TOTAL AREA= 1090 SQ.M.
11710 SQ.FT.
1300 SQ.YDS.
VOLUME= 1730 CU. YDS.

TP1- TOTAL (A,B & C)
TOTAL AREA= 260 SQ.M.
2800 SQ.FT.
310 SQ.YDS.
VOLUME= 255 CU. YDS.

WR2
TOTAL AREA= 2930 SQ.M.
31515 SQ.FT.
3500 SQ.YDS.
VOLUME= 7000 CU. YDS.

WR3
TOTAL AREA= 620 SQ.M.
6710 SQ.FT.
745 SQ.YDS.
VOLUME= 1490 CU. YDS.

WR5
TOTAL AREA= 2840 SQ.M.
23010 SQ.FT.
2560 SQ.YDS.
VOLUME= 5110 CU. YDS.

LEGEND

- | | | | |
|----------------|------------------------------------|-------|-------------------------------------|
| ⊗ | XRF SAMPLE | — | IMPROVED ROAD |
| ⊗ ^W | WATER SAMPLE
GROUND AND SURFACE | - - - | UNIMPROVED ROAD |
| Y | OPEN ADIT | ▨ | STRUCTURE |
| + | COLLAPSED ADIT | ▲ | SLOPE DIRECTION |
| → | DRAINAGE | ⬮ | WASTE ROCK OUMP
OR TAILINGS PILE |
| - - - | DRY DRAINAGE | | |

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

HARTLEY
PA# 07-082

DRAWING NO.: PT340250
DATE: 11/27/94

REV: -
PLOT SCALE: 1 = 20

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Mostly milled to small pebbles and some fines (sand).

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Tailings impoundment consisted of three small separate piles below the mill; no stratification was observed.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Because of heavy precipitation at this time, they were wet, but appear to be dry in most cases.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): The three piles are not contained and are eroding into Compromise Gulch. No dams exist.

Comments on potential for mitigation: Remove or regrade and vegetate.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (Yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (MR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	6,530	Upper dump, north of drainage; west face, near top	None	6.8 (D)	0.04	07-082-WR-1	06/08/94 1720	T-Metals, ABA
WR-2	WR	7,000	Upper dump, south of drainage; west face, near top of south end	None	6.8 (D)	0.05			
WR-3	WR	1,490	Middle dump, south of drainage; northwest face near top	None	6.8 (D)	0.05			
WR-4	WR	1,730	Lower dump, north of mill and below road; on top of north end	None	6.0 (D)	0.04	07-082-WR-2	06/08/94 1720	T-Metals, ABA
WR-5	WR	5,110	Lower dump, south of mill and below road; on top, above gully	None	6.5 (D)	0.05			
TP-1A	TAIL	255	Below lower road, north of drainage; near bottom of southwest corner	None	5.9 (D)	0.05	07-082-TP-1	06/08/94 1720	T-Metals, ABA
TP-1B	TAIL		Below lower road, south of drainage; on top, center	None	6.0 (D)	0.04			
TP-1C	TAIL		Dump at the south base of the mill; just above road on west face	None	5.2 (D)	0.04			

D-Direct reading (Railway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-082-WR-1 is composite of WR-1 through WR-3. 07-082-WR-2 is composite of WR-4 and WR-5. 07-082-TP-1 is composite of TP-1A through -1C. See Ripple Mine (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes____, No X, Number:____ Identification:_____

Filled shafts: Yes____, No X, Number:____ Identification:_____

Seeps/Springs: Yes____, No X, Number:____ Identification:_____

Groundwater wells within 4 miles?: Yes X, No____;

Number of well logs: 6

Distance to nearest well used for drinking:

____<1,000 ft; X 1,000 ft to 0.5 miles;____>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite____, Probable____, Possible X, Unlikely____.

Uncontained dumps; shallow groundwater in drainage

Approximate Depth to Groundwater: X <25 ft;____ 25 - 100 ft;____ >100 ft.

Other observations/notes: N/A

SAMPLERS:

WLOS: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Compromise Gulch below mine,
which is an intermittent stream that was flowing.

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes , No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No Source ID(s): WR-4, WR-5, and TP-1

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 15 to 20 gpm

High Flow: 0.5 cfs, Average Flow: 0.1 or less cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes , No X,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation,
residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Belt Creek has fishery, agriculture, and recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes X,
No . Distance downstream (ft)? 0-500 X; 500-1,000 ; >1,000 .
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures
or channel changes present): Some dump rock in Compromise Gulch for approximately
50 feet; gulch is well vegetated.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

[illegible]

DATE: 10/10/2012

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO ₃)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes____, No X, Describe:_____

Carbonate rocks/soils: Yes____, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___;
100-300 X; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: <1,000 ft; X 1,000 ft - 0.5 miles; >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:

observed	high	moderate	low	none
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ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (GIVE)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FE0X	Dry	35,270	35,270	Yes	Moderate
WR-2	FE0X	Dry	31,515	31,515	Yes	Low
WR-3	FE0X	Dry	6,710	6,710	No	Low
WR-4	FE0X	Dry	11,710	11,710	No	Low
WR-5	FE0X	Dry	23,010	23,010	No	Low
TP-1	FE0X	Dry	2,800	2,800	Yes	Low

Notes and Clarifications: _____

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10____; 10-30____; 30-100 X; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments Up Neihart Baldy Mountain from Neihart

Evidence of recreational use on site: Yes X, No____, Describe:_____
Dirt bike tracks; campfire rings

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium____, Low X

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes X, No____, Number 2, types and locations:_____
Remains of mill structure and loadout

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 5, types and locations: All waste rock piles are at angle of
repose.

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

- MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.
- MBMG, Well Log Database, July 14, 1994.
- MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.
- MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Hartley, Prepared by Daphne Diggrindakis, October 16, 1985.
- USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.
- USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

HARTLEY
PA NO. 07-082

Hartley PA# 07-082
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/08/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-082-SE1	103 J	160	939	29.5 JX	15.5 J	16.4 J	81.0 J	46600	0.16	19800 J	47.8	7980 JX	54.2 J	5340	NR
07-082-SE2	77.7 J	28.6	971	17.4 JX	8.66 J	31.9 J	98.2 J	18600	0.07	1160 J	33.5	1010 JX	8.6 UJ	1000	NR
07-082-TP1	105 J	133	658	28.9 JX	19.6 J	21.8 J	118 J	42000	0.32	13800 J	48.9	13900 JX	21.4 J	6650	NR
07-082-WR1	69.9 J	46.3	574	34.2 JX	6.51 J	21.5 J	266 J	15700	1.66	3570 J	17.1	3260 JX	12.7 J	8490	NR
07-082-WR2	64.1 J	72.9	211	28.1 JX	15.8 J	21.6 J	64.2 J	27100	0.06	7970 J	35.7	6270 JX	12.6 J	6310	NR
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected, J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL POTENT.		SULFUR ACID BASE POTENT.		PYRITIC SULFUR ACID BASE POTENT.		SULFUR ACID BASE POTENT.	
	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t
07-082-TP1	0.89	27.8	21.3	-6.5	0.06	0.39	0.44	12.2	9.14	
07-082-WR1	1.26	39.4	43.9	4.58	0.18	0.60	0.48	18.7	25.2	
07-082-WR2	0.64	20.0	40.7	20.7	0.08	0.32	0.24	10.0	30.7	

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-082-SW1	0.76	1.1 U	37.8	2.6 U	8.7 U	4.7 UX	4.6 U	146	0.11 U	4.4 U	8.0 U	9.7	29.4 U	494	70.7

U - Not Detected, J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-082-SW1	143	<5	39	0.28	NR

LEGEND

SE1 - Approximately 100' downgradient of WR4.
SE2 - Approximately 50' above the mine area.
TP1 - Composite of subsamples TP1A, 1B, and 1C.
WR1 - Composite of subsamples WR1, 2, and 3.
WR2 - Composite of subsamples WR4 and 5.
BACKGROUND - From the Ripple Mine (07-163-SS1).

SW1 - Same as sample 07-082-SE1.

XRF ANALYSIS RESULTS

**HARTLEY
PA NO. 07-082**

Mine Name: Hartley PA# 07-082
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-082-TP1A		24923	7631.36	5091.46		21659.4	54973		251.292 *	142.985 *	6383.79		131.355
07-082-TP1A-DUP		25204.3	7950.41	5130.64		21190.4	56056.5		306.073 *	175.132 *	6118.78		130.351
07-082-TP1B		21104.5	5045.5	3868.12		13305.7	46947.1		280.407 *	230.804 *	4433.8		88.6223
07-082-TP1C		17794.5	5799.96	2991.43	261.497 *	13353.7	36686		172.807 *	140.487 *	6435.57		230.3
07-082-TP1-COMP		22663.3	6515.61	4415.04		15520.6	45898.1		249.005 *	196.215 *	5836.2		172.135
07-082-WR1		26935.3	19997.2	1647.42		5233.99	28002.4		141.351 *	149.228 *	5573.1		347.754
07-082-WR1-COMP		28782.1	15211.6	1352.94		5306.3	23872.3		153.956 *	122.381 *	3519.83		326.206
07-082-WR2		30283.9	13259.5	1082.13	312.386 *	1471.49 *	16636.5				210.025 *		414.946
07-082-WR2-COMP		33326.9	9347.82	3492.56		11325	44349		286.898 *	234.238 *	5458.73		147.238
07-082-WR3	698.811 *	29331.4	18270.3	2354.43		17804.9	40642.8		175.136 *	280.922 *	7048.61		293.062
07-082-WR4	522.235 *	29731.4	8609.21	1913.3		8507.93	29656.7		166.406 *		1208.86		150.137
07-082-WR5	1056.21 *	34839.5	9000.64	3515.82		14026.7	44188.6		187.152 *	303.426 *	8506.46		157.331
07-082-WR5-DUP		35972.6	9709.77	3562.67		15572.3	44019.3		352.983 *	244.429 *	8405.36		153.745

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-082-TP1A	265.875			2710.76	148.967				2647.04	158.7 *		25.4245 *
07-082-TP1A-DUP	284.674			2799.48	152.876				2612.98	244.107 *		
07-082-TP1B	298.915			2176.24	149.499	180.931 *			3009.18	279.67 *		
07-082-TP1C	286.61			7653.96	102.233				2452.38	396.328		30.517 *
07-082-TP1-COMP	304.309			4810.6	136.826	172.02 *			3143.16	239.303 *		22.9357 *
07-082-WR1	130.818			1625.53	120.901				1930.58	183.127 *		
07-082-WR1-COMP	131.105			2162.07	124.886				2248.68	191.481 *		
07-082-WR2	125.51			230.032	104.784				1003.05			
07-082-WR2-COMP	192.032			4845.02	187.841				1588.08	367.739 *		28.5414 *
07-082-WR3	136.309			6048.81	176.047			98.6187 *	6339.19	343.987 *		
07-082-WR4	163.051		11.4982 *	663.042	196.152				592.209			14.4083 *
07-082-WR5	189.31			6049.48	194.871	219.077 *			1948.2	433.566		
07-082-WR5-DUP	188.022			6236.22	224.768	227.164 *			2025.34	395.722 *		32.9522 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**HARTLEY
PA NO. 07-082**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Hartley
07-082

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI	5
8		NEAREST WELL	5
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
			293105
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	300
12	SW - LIKELIHOOD	EXCEEDENCES	50
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18	SW - TARGETS	WETLANDS	10
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
			876650
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30	AIR - TARGETS	NEAREST RESIDENCE	5
31		WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
			2266
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF	ACCESSIBILITY	20
37B	EXPOSURE	DISTANCE TO POPULATION	10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	30
41	TARGETS	NEAREST RESIDENCE	5
42		RECREATIONAL USE	10
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
			13151
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		11.85
	(LINES 10 + 24 + 35 + 44) / 100,000		

LINE NO.			SITE NAME:	Hartley
			PA NUMBER:	07-082
	SITE SAFETY			
1	THREAT	ACCESSIBILITY		20
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4		UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	80
9	TARGETS	POPULATION - 1 MILE		30
10		NEAREST RESIDENCE		5
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 THRU 11	45
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	72.00



07-082, #19: WR-1



07-082, #20: WR-2



07-082, #21: WR-3



07-082, #22: WR-4



07-082, #23: WR-5



07-082, #24: Collapsed wooden mill



07-082, #25: Mill and tailings



07-082, #26: Facing west at tailings and down
Compromise Gulch

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: EMMA PA#: 07-144

Date: June 6, 1994 Time: 1230-1730

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Partly sunny; breezy; warm

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: Collapsed adit and WR-1A; #2: WR-1B; #3: WR-2 and loadout; #4: WR-3; #5: SW-2/SE-2 upgradient sample location (red iron staining in creek); #6: Old machinery. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: Oil in crank case of old machinery (pump?)

General Comments on Potential Remedial Alternatives: Remove waste dumps from drainage, contour, coversoil, and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): EMMA PA#: 07-144

Legal Description: T 14N ; R 8E ; Sec. 15 , NW 1/4 NW 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 58' 43" Longitude: W 110° 42' 04"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Squaw Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Lead, Zinc, Silver

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district: Related to mineralization at the Silver Dyke Complex.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 6400' , Slope 22° ,
Aspect Southeastern

Land use: Mining , Recreational X , Residential X , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 0.25 acre(s) .

Site Dimensions: 100 feet x 100 feet

Predominant vegetation types: Lodgepole pine

Access: roads - good (paved) , poor (maintained dirt road) X ,
4wd , trail .

Other logistical considerations (proximity to other sites).
Downhill from Silver Dyke Mill and downstream from Silver Dyke Adit.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius according to the MBMG Well Log Database; however, a residential well is located 0.25 mile upgradient from the site, and was sampled in 1993.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Intermittent drainage, Squaw Creek, flows south through the site. Squaw Creek flows into Carpenter Creek approximately 0.75 mile below the site. Carpenter Creek flows west to confluence with Belt Creek 2.25 miles downstream. The site is underlain by Precambrian gneisses in contact with Snow Creek porphyry.

Mining/milling history, ore type/tenor, host rock, gangue: No history available. Ore type is fissure filling. Observed gangue is composed of calcite and pyrite; observed host rock is granitic (Snow Creek porphyry).

Mine Operation?

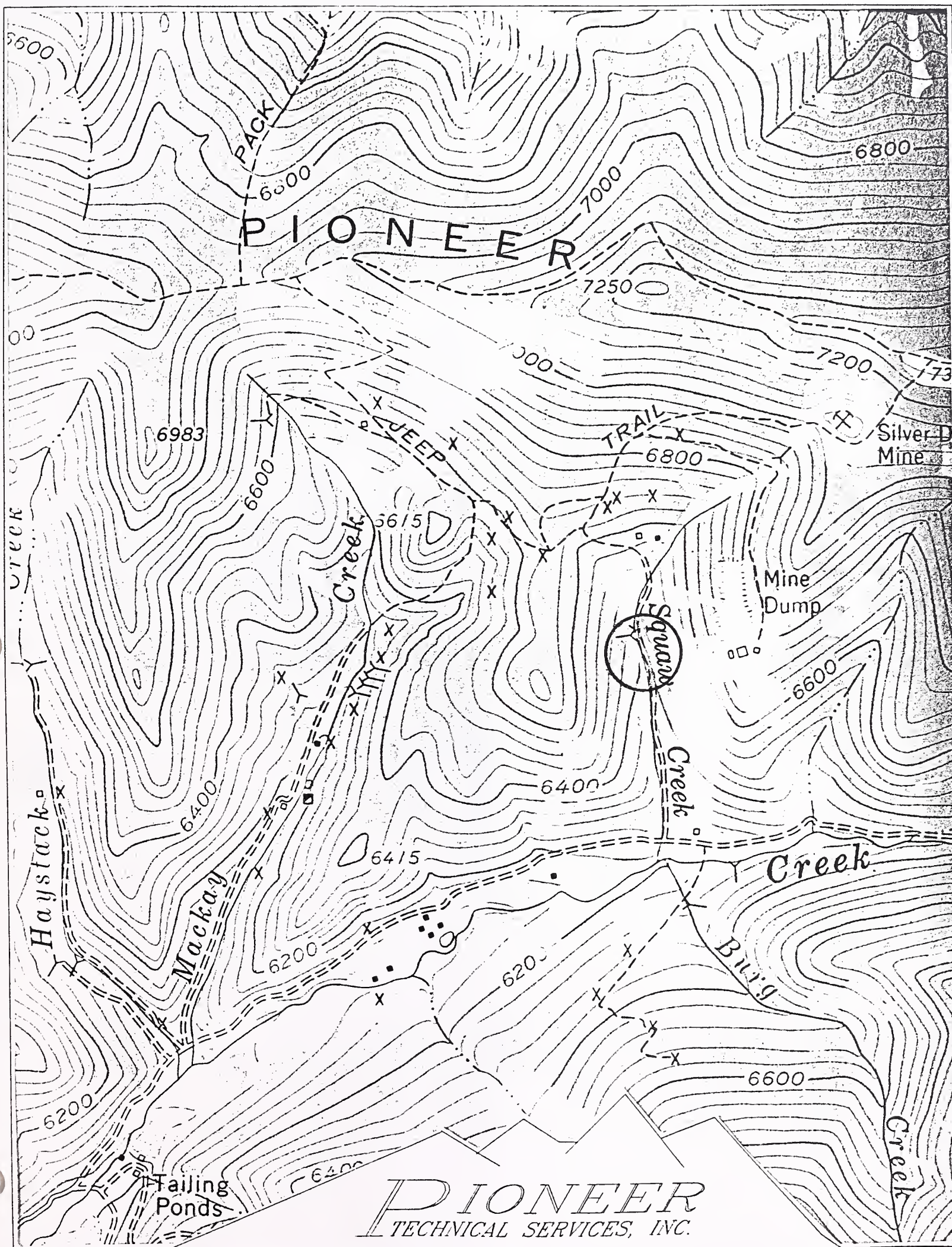
Shafts - Yes___, No X, # ___ , Comment_____
Adits - Yes X, No___, # 1 , Comment Collapsed
Pits - Yes___, No X, # ___ , Comment_____
Placers - Yes___, No X, # ___ , Comment_____
Other - Yes___, No X, # ___ , Comment_____

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

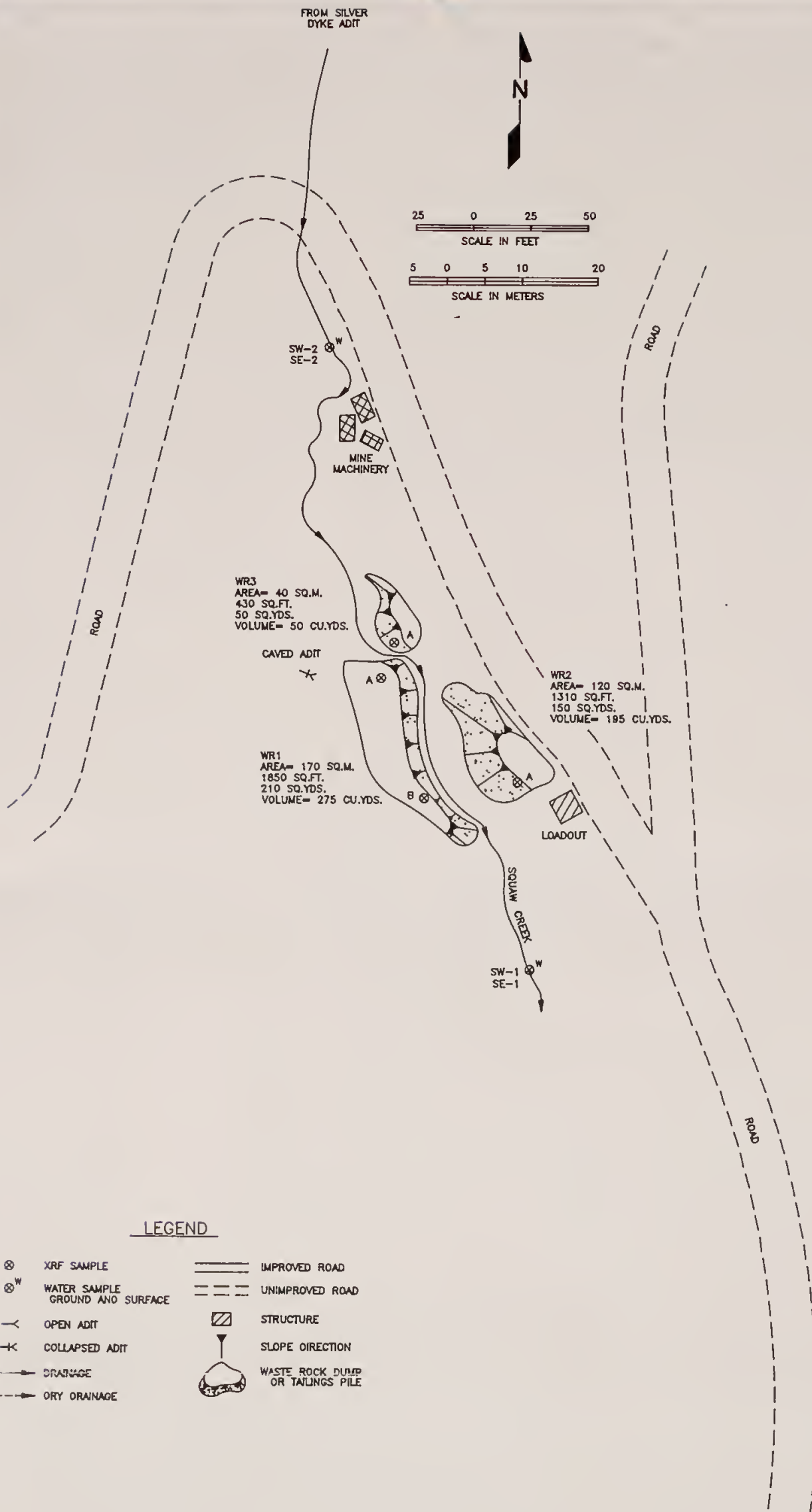
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



EMMA, P.A. NO. 07-144

T14N, R08E, SECTION 15

SCALE: 1" = 1000'



LEGEND

⊗	XRF SAMPLE	==	IMPROVED ROAD
⊗ W	WATER SAMPLE GROUND AND SURFACE	- - -	UNIMPROVED ROAD
Y	OPEN ADIT	▨	STRUCTURE
✕	COLLAPSED ADIT	▲	SLOPE DIRECTION
→	DRAINAGE	⬢	WASTE ROCK DUMP OR TAILINGS PILE
→	DRY DRAINAGE		

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

EMMA
PA# 07-144

DRAWING NO.: PT340242
DATE: 11/19/04

REV: -
PLOT SCALE: 1 = 15

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

[illegible]

D-Direct reading (Kelway Meter) ; S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-144-WR-1 is composite of WR-1B and WR-2. See Ripple Mine (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map

Flowing adits: Yes___, No X, Number:___ Identification:_____

Filled shafts: Yes___, No X, Number:___ Identification:_____

Seeps/Springs: Yes___, No X, Number:___ Identification:_____

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 12

Distance to nearest well used for drinking:

X <1,000 ft; ___ 1,000 ft to 0.5 miles; ___ >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible X, Unlikely___.

Uncontained dumps with high metals concentrations (copper, lead, zinc,
cadmium) and significant sulfides with low pH.

Approximate Depth to Groundwater: X <25 ft; ___ 25 - 100 ft; ___ >100 ft.

Other observations/notes: N/A

SAMPLERS:

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Well sampled last year for the inventory for Silver Dyke Adit is upgradient.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Squaw Creek

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes , No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No Source ID(s): WR-1, WR-2 and WR-3

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 0.165 cfs

High Flow: 1 cfs, Average Flow: 0.15 cfs

Distance between waste source(s) and nearest surface water body (ft)? 2 feet

Surface water draining onto or through waste sources: Yes X, No , Describe: Along toe of waste rock dumps

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Possible wetland on Carpenter Creek approximately 1 mile downstream.
Belt Creek has fishery, irrigation, and recreational use.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No . Distance downstream (ft)? 0-500 ; 500-1,000 ; >1,000 X. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Waste rock in streambed; waste rock from Silver Dyke Adit is also present.

SAMPLERS: Belanger

4 (N) per page 20 (2) printed: 10/2

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

(

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10

e

SAMPLERS: Tuesday, Belanger

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe: _____

Population within 1 mile: 1-10____; 10-30 X; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments One residence and some cabins

Evidence of recreational use on site: Yes X, No____, Describe: Garbage near machinery

Accessibility (check each that apply): X Easily accessible - no fences, gates, or warning signs;____ Moderately Accessible - barbed wire fences, road gated, or signs posted;____ Difficult Access - chain-link fence, road gated and locked, site guarded (does not include locked or manned access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment _____
Wilderness Area - Yes____, No X, Comment _____
T&E Species Habitat - Yes____, No X, Comment _____
Bat Habitat - Yes____, No X, Comment _____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium____, Low X

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:____

Hazardous structures: Yes X, No____, Number 1, types and locations: Loadout

Unstable highwalls, pits, trenches, slopes: Yes X, No____, Number 1, types and locations: Above caved adit

Unstable waste piles, impoundments, undercut banks: Yes X, No____, Number 3, types and locations: Waste rock slopes at angle of repose.

Fire and/or Explosion hazards: Yes____, No X, Explain: _____

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Emma, Prepared by Daphne Digrindakis, October 17, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

EMMA

PA NO. 07-144

Emma PA# 07-144
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/06/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-144-SE1	53.5 J	36.0	67.6	26.0 JX	26.3 J	19.3 J	3510 J	36000	0.03 U	3070 J	9.5	2240 JX	8.9 J	6390	NR
07-144-SE2	12.3 J	29.5	101	20.7 JX	20.1 J	14.8 J	1050 J	28400	0.04 U	2750 J	8.6	2910 JX	7.6 J	4350	NR
07-144-WR1	16.2 J	35.9	42.3	52.2 JX	24.4 J	11.4 J	1210 J	47800	0.04	2430 J	14.6	8460 JX	20.2 J	14200	NR
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	ACID BASE U/1000t	NEUTRAL POTENT. U/1000t	SULFUR POTENT. U/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC ACID BASE U/1000t	SULFUR ACID BASE POTENT. U/1000t
07-144-WR1	4.04	126	11.3	-115	<0.01	2.39	2.96	74.7	-63.3

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
07-144-SW1	0.73	1.1 U	20.6	397	96.1	4.7 UX	4370	4220	0.11 U	49900	145	618	112 J	59800	594
07-144-SW2	0.92	1.1 U	21.9	447	105	8.6 JX	4980	5180	0.11 U	58000	170	703	131 J	67600	655

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-144-SW1	1180	<5	737	0.23	NR
07-144-SW2	1320	<5	859	0.22	NR

LEGEND

SE1 - Square Creek; 80' below lowest dump.
SE2 - Square Creek; 40' above machinery, below road.
WR1 - Composite of subsamples WR1B and WR2.
BACKGROUND - From the Riddle Mine (07-143-SS1).

SW1 - Same as sample 07-144-SE1.
SW2 - Same as sample 07-144-SE2.

XRF ANALYSIS RESULTS

EMMA

PA NO. 07-144

Mine Name: Emma PA# 07-144
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHl	K	Ca	Tl	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-144-WR1A		19609.6	5243.1	2132.09		7179.39	42644.2			458.582	723.261		289.864
07-144-WR1B		11930 \$	11310 \$	2480 \$		7130 \$	95840 \$	310 \$		598 \$	1188 \$		524 \$
07-144-WR1-COMP		12395.9	10931.9	2207.27		6064.53	73024.2			2346.44	12002.3		427.018
07-144-WR2		13422.6	12776.4	2038.17		5905.1	50760.1			3794.1	26333.2		288.954
07-144-WR2-DUP		13442.6	12810.6	2046.56		6026.67	51164.6	622.037 *		3766.39	26440.5		295.86
07-144-WR3A		16089.2	5806.76	2053.86		14742.6	50854.7			786.748	919.917		295.677

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-144-WR1A	169.353			1792.62	186.113				1292.27		19.6463 *	19.167 *
07-144-WR1B	86.9 \$		25.4 \$	4062 \$	127 \$	124 \$			1179 \$		26.4 \$	12.6 \$
07-144-WR1-COMP	46.327 *		16.5388 *	4638.19	106.263 *	195.663 *			723.048	167.24 *		
07-144-WR2	45.1517 *			6972.86	133.998	268.745 *			444.104			
07-144-WR2-DUP	56.4287	138.503 *	16.3593 *	7144.97	96.0116 *	232.935 *			434.864			
07-144-WR3A	146.989		20.0256 *	2440.38	177.71				1274.72			29.3585 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**EMMA
PA NO. 07-144**

AIMSS SCORESHEET

SITE NAME:

Emma

PA NUMBER:

07-144

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	2.5
7	GW - TARGETS	WELLS - 1 TO 4 MI	11
8		NEAREST WELL	10
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	300
12	SW - LIKELIHOOD	EXCEEDENCES	0
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	1
18		WETLANDS	10
19	SW - TARGETS	FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	10
26B	OF RELEASE	DISTANCE TO POPULATION	20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	10
31	AIR - TARGETS	WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF	ACCESSIBILITY	20
37B	EXPOSURE	DISTANCE TO POPULATION	20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	10
41	TARGETS	NEAREST RESIDENCE	10
42		RECREATIONAL USE	2
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		0.63

SITE NAME:

Emma

PA NUMBER:

07-144

LINE
NO.SITE SAFETY

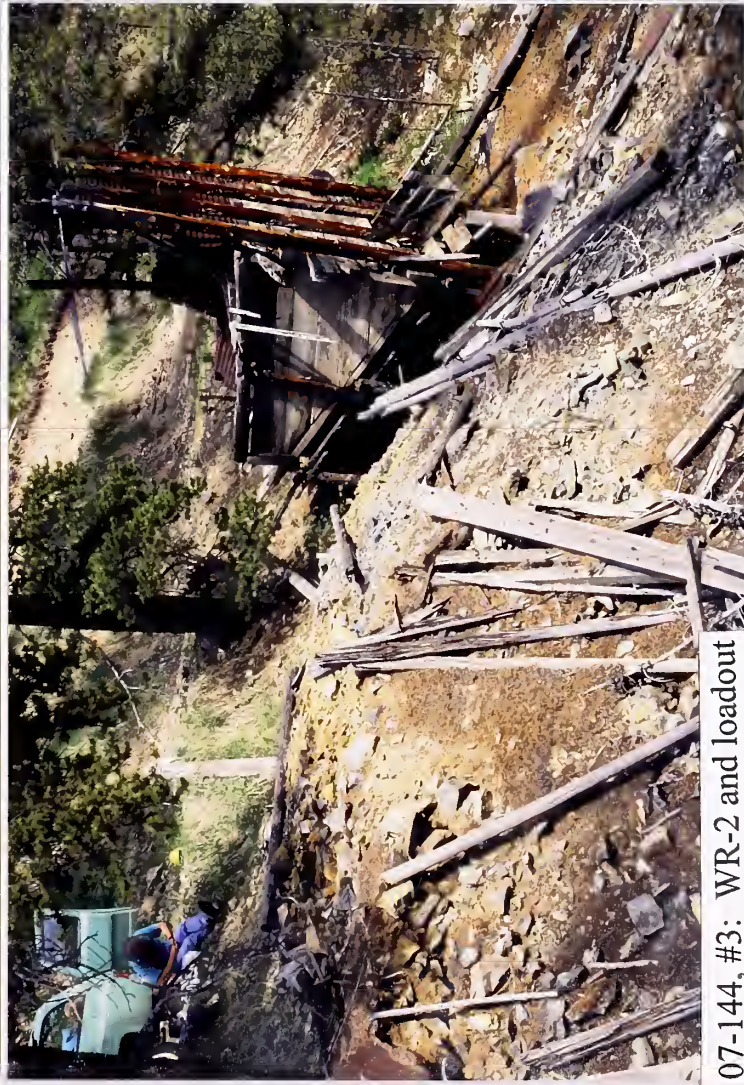
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		100
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	215
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	22
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	94.60



07-144, #1: Collapsed adit and WR-1A



07-144, #2: WR-1B



07-144, #3: WR-2 and loadout



07-144, #4: WR-3



07-144, #5: SW-2 and SE-2 sample location



07-144, #6: Old machinery

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: REBELLION (UPPER & LOWER) PA#: 07-157 & 07-158

Date: June 9, 1994 Time: 0826-1120

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: Earl McCurley, MDSL/AMRB
Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Clear skies; sunny; cold; slight breeze; snowed the day before investigation.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): 07-157, #1: WR-1; #2: WR-2 and loadout facing south; #3: WR-2 and loadout facing north; #4: WR-3; #5: WR-4 facing south; #6: WR-4 facing north; #7: Seep at base of WR-4 and WR-5, AD-1 sample location; #8: Seep at base of WR-4 below old loadout, AD-2 sample location; #9: Downgradient flow of seep at base of WR-4 below old loadout; #10: Upper Rebellion and Ripple in background; #11: Overview of site. 07-158, #12: Adit #1 discharge; #13: Lower Rebellion and corresponding dump; #14: Upper and Lower Rebellion.
Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Divert adit discharge away from waste dumps and possibly treat. Recontour and revegetate dumps.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): REBELLION (UPPER & LOWER) PA#: 07-157 & 07-158

Legal Description: T 14N ; R 8E ; Sec. 27 , SW 1/4 NW 1/4 1/4
T 14N ; R 8E ; Sec. 27 , NW 1/4 NW 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 53" Longitude: W 110° 42' 13"
Latitude: N 46° 57' 00" Longitude: W 110° 42' 00"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Snow Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Gold, Silver, Lead, Zinc

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y X N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Hatfield,
Great Falls, MT.

Relationship to other mines/sites in the area/district: Northwest
of the Ripple Mine (07-149) and Ripple No. 3 (07-163).

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 6800'-7200' , Slope 23° ,
Aspect North

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 5 acre(s) .

Site Dimensions: 500 feet x 300 feet (Upper); 200 feet x 400 feet
(Lower)

Predominant vegetation types: Douglas fir/Lodgepole pine forest

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites).
Located directly below the Ripple Mine. Locked gate on Snow Creek
Road approximately 1/2 mile below the Lower Rebellion.

Well logs within 1 mile radius; (Attach MEMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by pinto diorite and gneiss. Site lies well above Snow Creek. Water leaving the site would flow north to confluence with Snow Creek approximately 1/3 mile away. Snow Creek flows west to confluence with Carpenter Creek 1.5 miles away. Carpenter Creek flows west to Belt Creek.

Mining/milling history, ore type/tenor, host rock, gangue: No history available. Vein deposit in pinto diorite and Precambrian gneisses. Gangue is mainly crushed, altered host rock.

Mine Operation?

Shafts - Yes , No X, # , Comment
Adits - Yes X, No , # 3, Comment All caved; 2 discharging (Upper); 1 discharging (Lower)

Pits - Yes , No X, # , Comment

Placers - Yes , No X, # , Comment

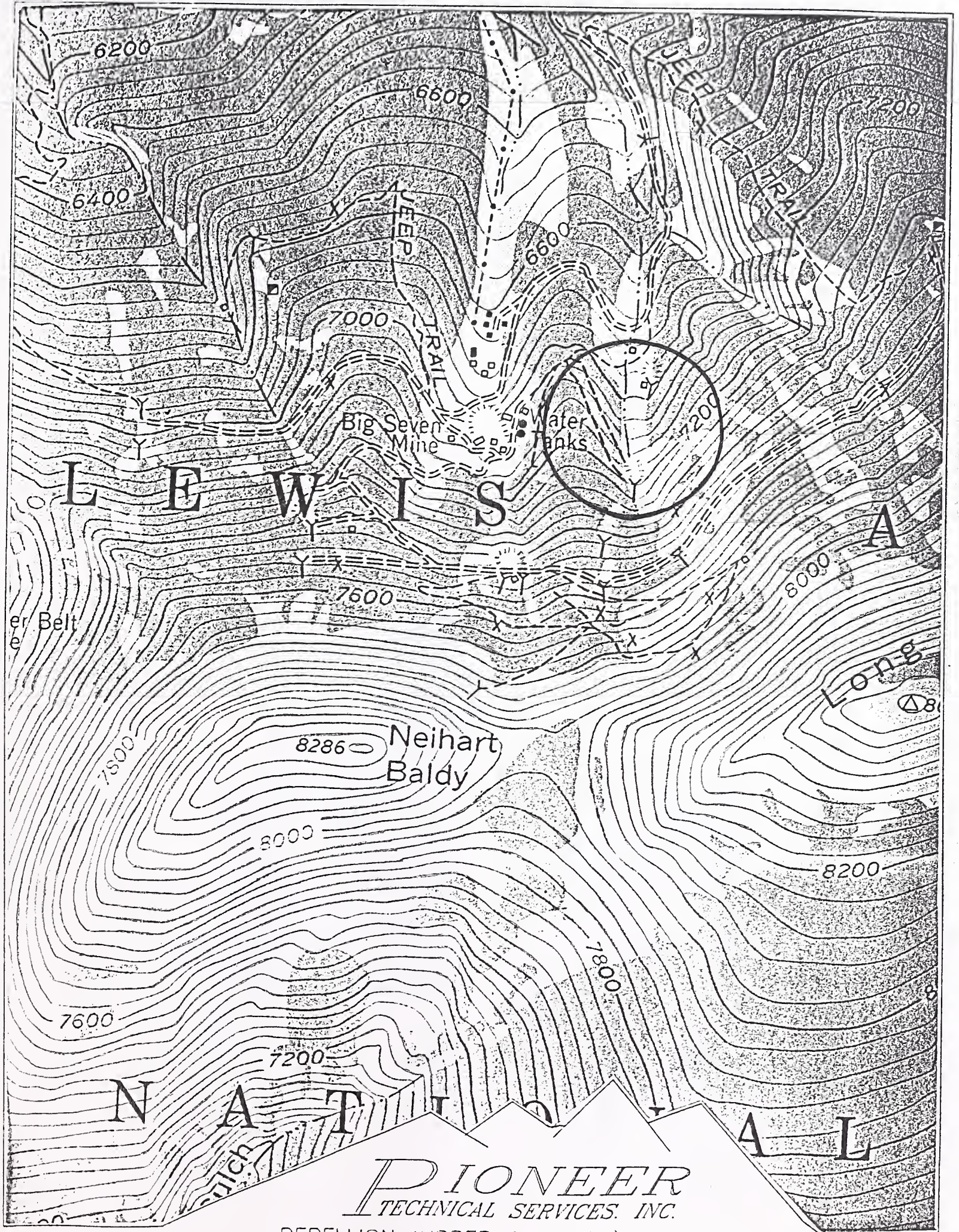
Other - Yes , No X, # , Comment

Mill Operation? Yes , No X. If yes answer the next three questions:

Period(s) of Operation: N/A

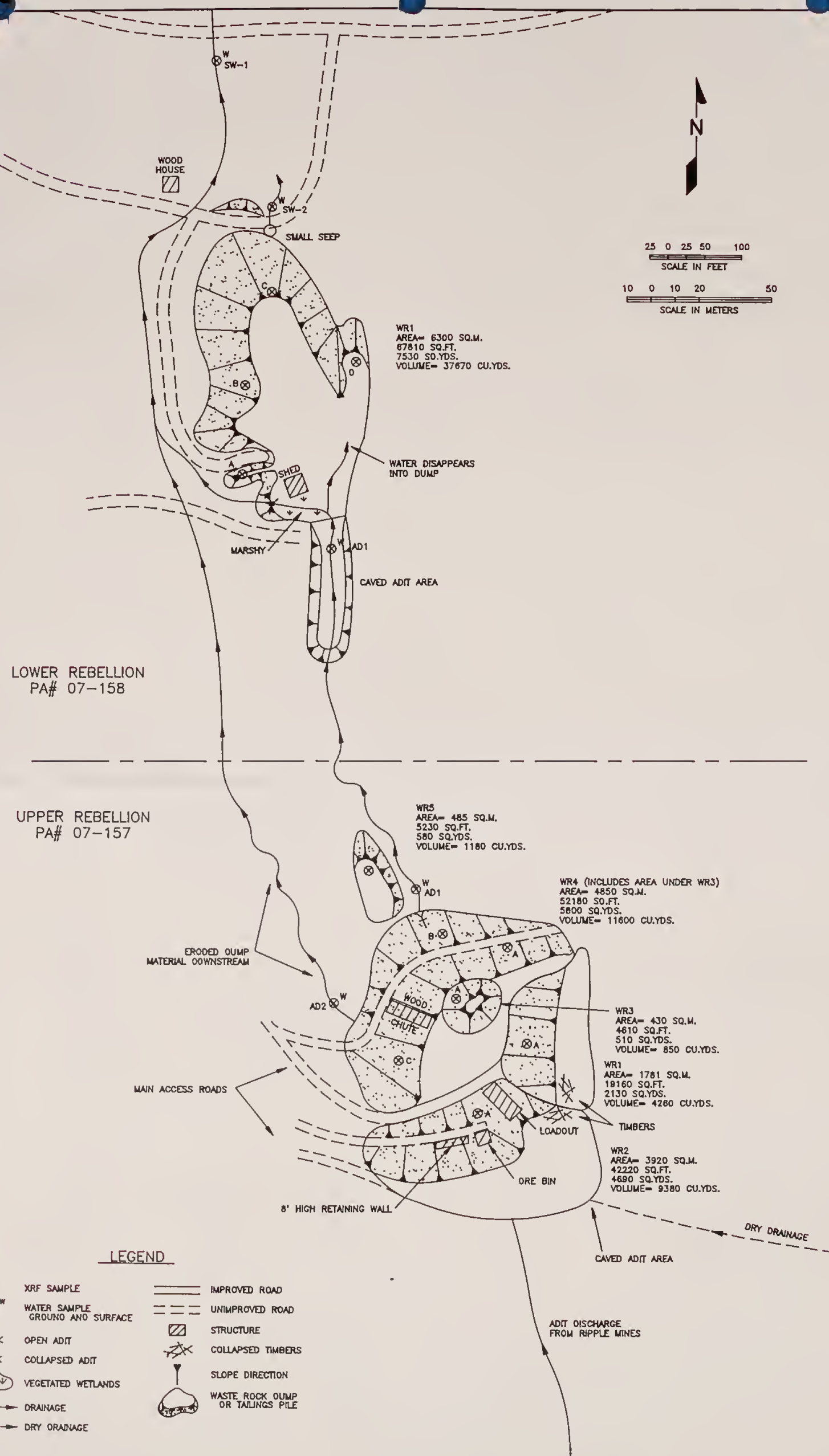
Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? N/A



PIONEER
TECHNICAL SERVICES, INC.

REBELLION (UPPER & LOWER), P.A. NOS.
07-157 & 07-158
T14N, P08E, SECTION 27
SCALE: 1" = 1000'



LOWER REBELLION
PA# 07-158

UPPER REBELLION
PA# 07-157

LEGEND

- | | | | |
|----------------|------------------------------------|-------|-------------------------------------|
| ⊗ | XRF SAMPLE | — | IMPROVED ROAD |
| ⊗ ^W | WATER SAMPLE
GROUND AND SURFACE | - - - | UNIMPROVED ROAD |
| — | OPEN ADIT | ▧ | STRUCTURE |
| — | COLLAPSED ADIT | ⌵ | COLLAPSED TIMBERS |
| ⬇ | VEGETATED WETLANDS | ⬇ | SLOPE DIRECTION |
| → | DRAINAGE | ⬆ | WASTE ROCK OUMP
OR TAILINGS PILE |
| → | DRY DRAINAGE | | |

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

UPPER & LOWER REBELLION
PA#'s 07-157 & 07-158

DRAWING NO.: PT340256

REV: -

DATE: 11/19/94

PLOT SCALE: 1 = 40

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1	WR	4,260	Upper Rebellion, east side of upper dump; west face, near middle	None	6.2 (D)	0.055	07-157-WR-1	06/09/94 1730	T-Metals, ABA
WR-2	WR	9,380	Upper Rebellion, west side of upper dump; south of loadout	None	6.6 (D)	0.075			
WR-3	WR	850	Upper Rebellion, center of middle pile	None	6.2 (D)	0.045			
WR-4A	WR	11,600	Upper Rebellion, east side of lower dump; above road	None	5.4 (D)	0.06	07-157-WR-2	06/09/94 1730	T-Metals, ABA
WR-4B	WR		Upper Rebellion, center of lower dump; below road	None	6.3 (D)	0.065			
WR-4C	WR		Upper Rebellion, southwest side of lower dump; above road	None	5.7 (D)	0.06			
WR-5	WR	1,160	Upper Rebellion, north end of lowest dump; near discharge	None	6.7 (D)	0.05			
WR-1A	WR	37,670	Lower Rebellion; west lobe	None	< 3.5 (D)	0.05	07-158-WR-1	06/09/94 1728	T-Metals, ABA
WR-1B	WR		Lower Rebellion; northwest lobe	None	3.9 (D)	0.05			
WR-1C	WR		Lower Rebellion; north lobe	None	5.2 (D)	0.05			
WR-1D	WR		Lower Rebellion; northeast lobe	None	6.0 (D)	0.07			

D-Direct reading (Galway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-157-WR-1 is composite of WR-1 through WR-3. 07-157-WR-2 is composite of WR-4A through -4C, and WR-5 (Upper Rebellion). 07-158-WR-1 is composite of WR-1A through -1D (Lower Rebellion). See Ripple Mine (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 3 Identification: Adit associated with WR-5 and possible adit at the base of WR-4 (Upper); adit behind buildings (Lower).

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes , No X, Number: Identification:

Groundwater wells within 4 miles?: Yes X, No ;

Number of well logs: 7

Distance to nearest well used for drinking:

 <1,000 ft; 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Uncontained waste rock containing elevated metals; groundwater in contact with adits and dumps.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: N/A

SAMPLERS: Tuesday, Belanger

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Unnamed tributary of Snow Creek

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes X, No , Name(s)/Description: Adit discharge, which flows down the drainage below the Lower Rebellion

Waste materials within any floodplain: Yes X, No Source ID(s): WR-2, WR-4, and WR-5 (Upper); WR-1 (Lower)

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 20 gpm
High Flow: 50 gpm, Average Flow: Dry

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ,
Describe: Adit discharges flow through the waste piles.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Belt Creek has fishery, recreation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No . Distance downstream (ft)? 0-500 X; 500-1,000 ; >1,000 .
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): At the Lower Rebellion, water stopped flowing approximately 200 feet below the toe of WR-1. Waste rock material lies within the stream channel.

SAMPLERS:

Flow: Estimated (E) or Measured (M) ?

MDSL AMRB/PIONEER 5/16/94

(

ne

1

—

or

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
UPPER WR-1	SO3	Dry	19,160	19,160	Yes	Low
WR-2	SO3; FEOX	Dry	42,220	42,220	Yes	Low
WR-3	FEOX	Dry	4,610	4,610	Yes	Low
WR-4	SO3; FEOX	Dry	52,180	52,180	Yes	Low
WR-5	FEOX	Dry	5,230	4,970	No	Low
AD-1	pH; FEOX	N/A	N/A	N/A	N/A	N/A
AD-2	pH; FEOX	N/A	N/A	N/A	N/A	N/A
LOWER WR-1	SO3; pH	Dry	67,810	61,030	Yes	Moderate
AD-1	FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply):____ Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted; X Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____
Wetlands Frontage - High____, Medium____, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes X, No____, Number 4, types and locations:____
Two loadouts located on WR-2 (Upper); two old sheds on top of dump
(Lower)

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0,
Prepared by Montana Natural Resource Information System, December
1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Forms for
Upper and Lower Rebellion Mine, Prepared by Chen-Northern, October
23, 1989.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**REBELLION (UPPER & LOWER)
PA NO. 07-157 & 07-158**

Rebellion (Upper & Lower) PA# 07-157 & 07-158
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/09/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-157-WR1	67.9 J	181	401	10.1 JX	6.37 J	4.86 J	64.0 J	22900	0.48	7090 J	7.6	2380 JX	9.4	2040	NR
07-157-WR2	98.7 J	155	345	12.8 JX	5.18 J	5.89 J	117 J	36300	0.34	1920 J	5.5	3090 JX	11.4	2950	NR
07-158-WR1	7.9 J	53.9	29.5	3.71 JX	10.8 J	8.92 J	71.4 J	24000	0.42	1990 J	15.1	713 JX	4.7 UJ	536	NR
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE V/1000t	NEUTRAL POTENT. V/1000t	SULFUR ACID BASE POTENT. V/1000t	SULFATE %	SULFATE Sulfur %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENT. V/1000t	SULFUR ACID BASE POTENT. V/1000t
07-157-WR1	1.20	37.5	39.0	1.48	0.26	0.35	0.59	0.13	18.4	20.5
07-157-WR2	0.49	15.3	3.24	-12	0.34	0.13	0.02	0.13	0.62	2.62
07-158-WR1	0.52	16.2	3.71	-13	0.26	0.18	0.08	0.18	2.50	1.21

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
07-157-AD1	4.42	15.4	15.1	68.5	16.4	7.1 JX	263	6880	0.11 U	10200	45.5	221	29.4 U	10200	113
07-157-AD2	4.23	12.5	15.0	68.1	16.7	5.5 JX	263	5680	0.11 U	10300	40.8	235	29.4 U	10400	115
07-158-AD1	1.12	1.1 U	12.2	22.9	11.7	4.7 UX	45.6	1780	0.11 U	9140	29.8	53.5	29.4 U	4730	124
07-158-SW1	1.13	1.1 U	12.5	42.0	8.7 U	4.7 UX	97.2	25.0	0.11 U	7960	38.9	19.1	29.4 U	7450	116

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-157-AD1	284	<5	166	<0.05	NR
07-157-AD2	271	<5	168	0.25	NR
07-158-AD1	233	<5	141	<0.05	NR
07-158-SW1	243	<5	142	<0.05	NR

LEGEND

07-157-WR1 - Composite of subsamples WR1 through WR3.
07-157-WR2 - Composite of subsamples WR4A through 4C and 5.
07-158-WR1 - Composite of subsamples WR1A through 1D.
BACKGROUND - From the Ripple Mine (07-163-SS1).

07-157-AD1 - Add discharge at base of WR4, near WRS.
07-157-AD2 - Add discharge at base of WR4 below old loadout.
07-158-AD1 - Add discharge from the curved add behind buildings at Lower M.
07-158-SW1 - Downstream from Lower Rehabilitation mine in unnamed trib.
of Snow Creek.

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

XRF ANALYSIS RESULTS

**REBELLION (UPPER & LOWER)
PA NO. 07-157 & 07-158**

Mine Name: Rebellon (Upper & Lower) PA# 07-157 & 07-158
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHl	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-157-WR1		45053.7	7991.26	3182.3		10123.4	28129.7		179.168 *	138.965 *	3254.05		166.367
07-157-WR1-COMP		40348.9	8397.64	3928.43		4824.85	29423.1			132.374 *	1339.27		119.612
07-157-WR2		39584.5	2637.11	2679.96			34338.6			151.246 *	630.55		106.1
07-157-WR2-COMP		30048.5	3038.23	3204.8		4506.16	51196.6			165.064 *	1239.12		67.9393
07-157-WR3		51213.4	19338.9	3490.58		8487.45	22760.5				1075.22		106.441
07-157-WR4A		35852.6	1503.96	2648.55		806.512 *	53333.7		195.855 *	221.77 *	1431.24		27.2011 *
07-157-WR4B		34744	2676.3	3427.55		4990.38	52838.5		158.519 *	168.252 *	656.237		95.9003
07-157-WR4C		45559.5	5556.46	5089.75			39037.7			200.254 *	1781.24		113.448
07-157-WR5		32081.4	3200.02	3905.92		8004.25	62878.8			132.375 *	2189.44		82.3224
07-158-WR1A		20655.6	5401.48	3541.83		6724.33	81561.6			116.614 *	749.276		219.05
07-158-WR1B	300 \$	19140 \$	7470 \$	4880 \$		5970 \$	46030 \$		109 \$	181 \$	641 \$	74 \$	200 \$
07-158-WR1C		36240 \$	2190 \$	2250 \$		1910 \$	60120 \$	270 \$		37 \$	2039 \$		67.5 \$
07-158-WR1D		18020 \$	1770 \$	389 \$	275 \$	940 \$	12860 \$		56 \$	22 \$	418 \$	31 \$	68.2 \$
07-158-WR1-COMP	220 \$	21460 \$	4700 \$	3080 \$		3560 \$	53860 \$		122 \$	52 \$	1534 \$		181.7 \$

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-157-WR1	133.687			2809.63	271.273	169.596 *		68.7436 *	3938.11	227.766 *		
07-157-WR1-COMP	167.368			2617.55	216.442				1587.28	108.559 *		24.9926 *
07-157-WR2	268.506			3091.78	211.804				2030.55	130.415 *		25.0533 *
07-157-WR2-COMP	145.462		17.1071 *	3533.98	225.442				2325.24	218.327 *		31.1187 *
07-157-WR3	234.079			399.264	291.097				215.481		22.817 *	19.0695 *
07-157-WR4A	204.582		27.6898 *	5567.69	213.593				206.792	460.08		
07-157-WR4B	172.959			1763.84	223.164				484.959			
07-157-WR4C	305.803			4153.6	268.548	198.165 *		122.302 *	4553.81	154.728 *		39.8441 *
07-157-WR5	180.205			1455.73	226.376				450.639			
07-158-WR1A	498.002		16.7459 *	1836.68	153.888	220.027 *			996.921			
07-158-WR1B	171.7 \$			123 \$	142.8 \$				746 \$	153 \$	23.9 \$	15.6 \$
07-158-WR1C	175 \$		20.6 \$	3370 \$	243 \$	134 \$			311 \$	73 \$	8.3 \$	
07-158-WR1D	123.4 \$			216 \$	187.9 \$			15 \$	359 \$	65 \$	19 \$	21.8 \$
07-158-WR1-COMP	213.4 \$		9.7 \$	1039 \$	180 \$	96 \$			500 \$	35 \$	12.7 \$	21.8 \$

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**REBELLION (UPPER & LOWER)
PA NO. 07-157 & 07-158**

AIMSS SCORESHEET

SITE NAME: Rebellion Upper & Lower
PA NUMBER: 07-157

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 70.355
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	7
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 7.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 196994
SURFACE WATER PATHWAY			
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES	100
13A		CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 500
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 78.833
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	10
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 18
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 709497
AIR PATHWAY			
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	5
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 25
27		LIKELIHOOD SCORE	LINES 25 + 26C 25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.702
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31		WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 30
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 527
DIRECT CONTACT PATHWAY			
36		OBSERVED EXPOSURE	0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	5
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 25
38		LIKELIHOOD SCORE	LINES 36 + 37C 25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.629
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	1
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	0
43		TARGETS SCORE	SUM LINES 40 THRU 42 1
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 16
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000		9.07

SITE NAME: Rebellion Upper & Lower
 PA NUMBER: 07-157

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	160
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	0.80



07-157, #1: WR-1



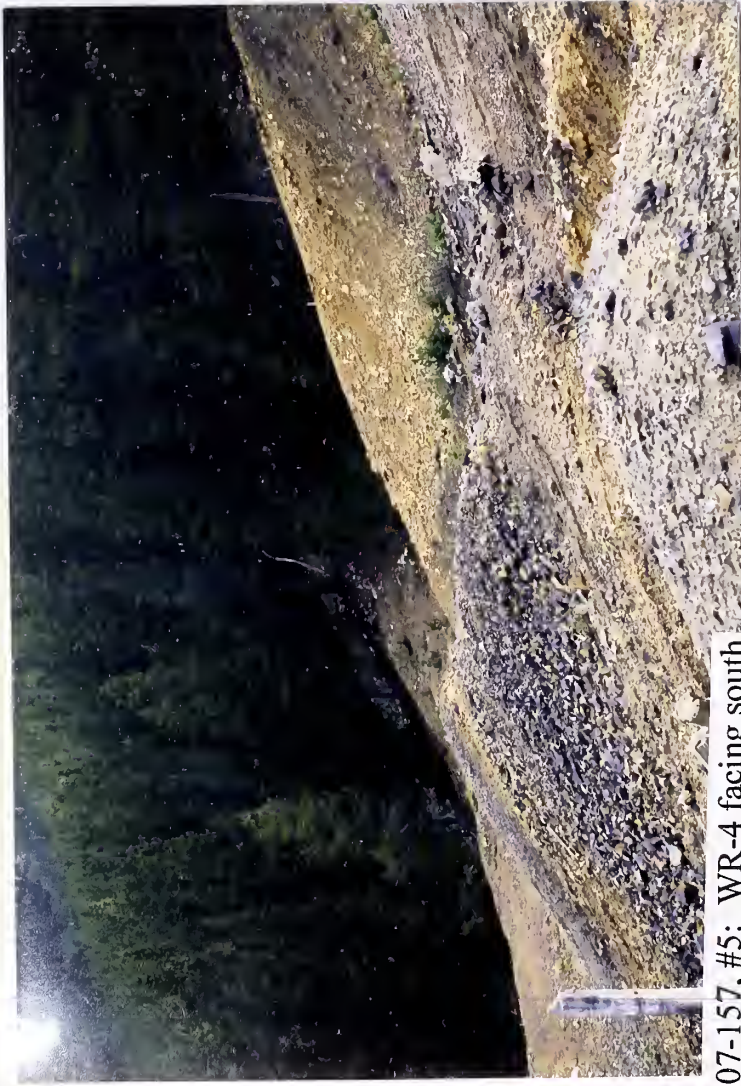
07-157, #2: WR-2 facing south and loadout



07-157, #3: WR-2 facing north and loadout



07-157, #4: WR-3



07-157, #5: WR-4 facing south



07-157, #6: WR-4 facing north



07-157, #7: Seep at base of WR-4 and WR-5; AD-1 sample location



07-157, #8: Seep at base of WR-4 below old loadout; AD-2 sample location



07-157, #9: Downgradient flow of seep at base of WR-4
below old loadout



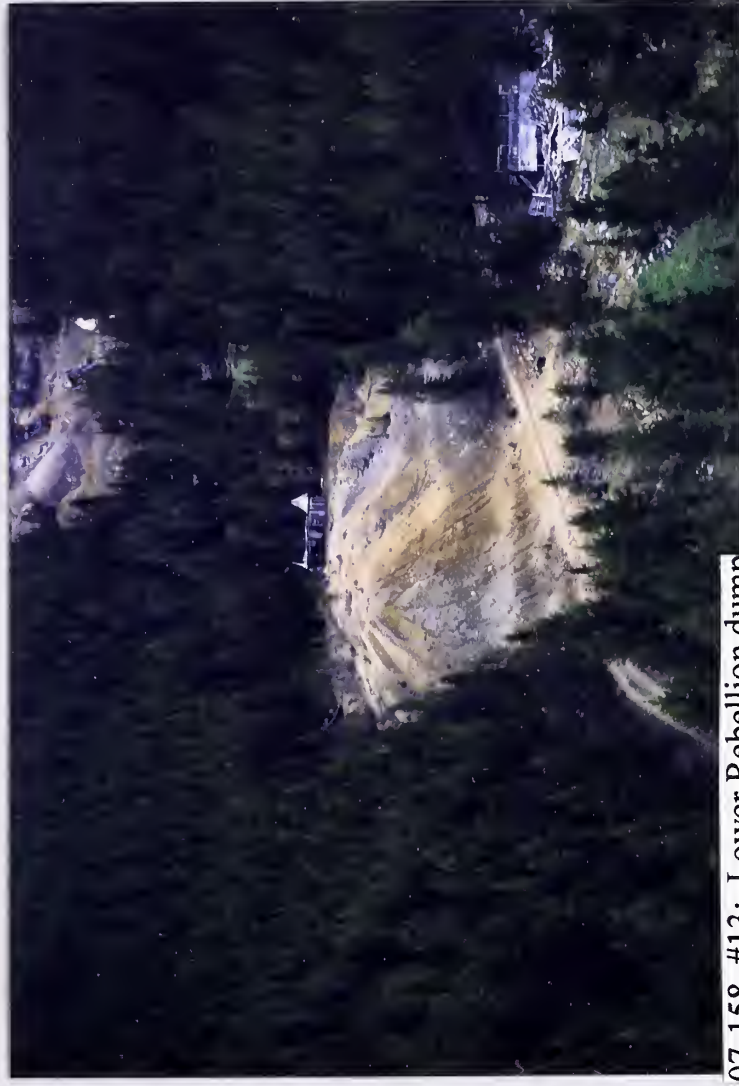
07-157, #10: Upper Rebellion and Ripple (background)



07-157, #11: Overview of site



07-158, #12: Adit #1 discharge



07-158, #13: Lower Rebellion dump



07-158, #14: Upper and Lower Rebellion

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: RIPPLE MINES PA#: 07-163

Date: June 7, 1994 Time: 0830-1420

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: Earl McCurley, MDSL/AMRB
Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Cool; breezy; partly sunny

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #7: Adit #3
discharge; #8: WR-4; #9: Adit #2 discharge (associated with WR-2);
#10: Adit #1 (HMO); #11: Adit #1 discharge; #12: WR-1B (left) and
WR-1A (right); #13: Upper part of WR-1A, WR-2, and WR-4; #14: WR-
1A, WR-2, and WR-4; #15: WR-2 and discharge; #16: WR-3 (Ripple No.
3). Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is spread out over hillside in four distinct areas of
disturbance; very steep.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Difficult to
revegetate (very steep, rocky, and near timber line).

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): RIPPLE MINES PA#: 07-163

Legal Description: T 14N ; R 8E ; Sec. 27 , NE 1/4 SW 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 43" Longitude: W 110° 41' 52"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Snow Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Gold, Lead, Zinc

Activity Status: Active , Inactive/Exploration X , Abandoned .

Ownership: Known Y X N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Hatfield, Great Falls, MT.

Relationship to other mines/sites in the area/district: Between the Flora and Tom Hendricks claims; in the upper Snow Creek Valley east of the Benton. Adit driven into claim from the Flora, and three adits were extended into Tom Hendricks claim and developed.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 7400'-7820', Slope 28° ,
Aspect Northwest

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other(Specify)

Area of disturbed/unvegetated lands? 3 acre(s) .
Site Dimensions: 200 feet x 400 feet, 200 feet x 200 feet, and 100 feet x 50 feet

Predominant vegetation types: Douglas fir, Lodgepole pine

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites). Gate at bottom of access road; another gate on Snow Creek Road approx. 2 miles below the site.

Well logs within 1 mile radius; (Attach MRMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is underlain by Pinto diorite and quartzose gneiss. Site lies above the headwaters of Snow Creek; water leaving the site flows north to Snow Creek. Water in Snow Creek flows north and then west to confluence with Carpenter Creek 2 miles away. Carpenter Creek then flows west to confluence with Belt Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Claim was located in 1883. Mine has been worked sporadically since 1905 to at least 1950. Production from 1906 to 1945 inclusive, was reported as 25,634 tons of ore producing 1,144 oz. gold, 523,857 oz. silver, 3,805 lbs. copper, 749,937 lbs. lead, and 7,234 lbs. zinc. Ripple Mine is developed by three adits; No. 3 is the lower adit. Prior to 1917, some ore was shipped to the East Helena Smelter. In 1943, several thousand tons of dump material were milled (possibly milled at the Lexington site). Vein deposit in Pinto diorite and gneiss. Gangue material is crushed altered host rock. Sulfide minerals mainly consist of galena, sphalerite, and pyrite with small amounts of chalcopyrite.

Mine Operation?

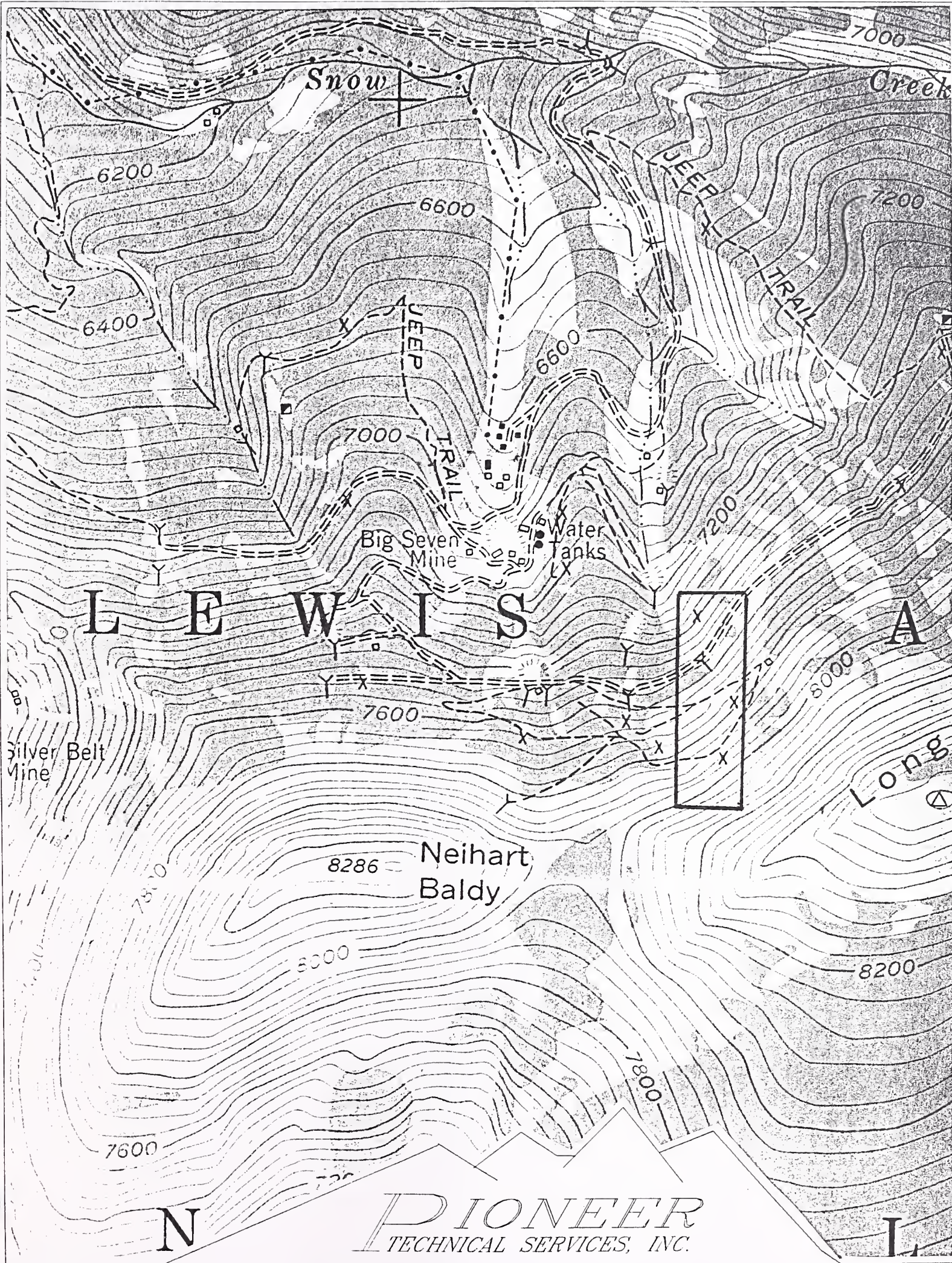
Shafts - Yes___, No X, # ___ , Comment___
Adits - Yes X, No___, # 4 , Comment 3 open; all discharging
Pits - Yes___, No X, # ___ , Comment___
Placers - Yes___, No X, # ___ , Comment___
Other - Yes___, No X, # ___ , Comment___

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

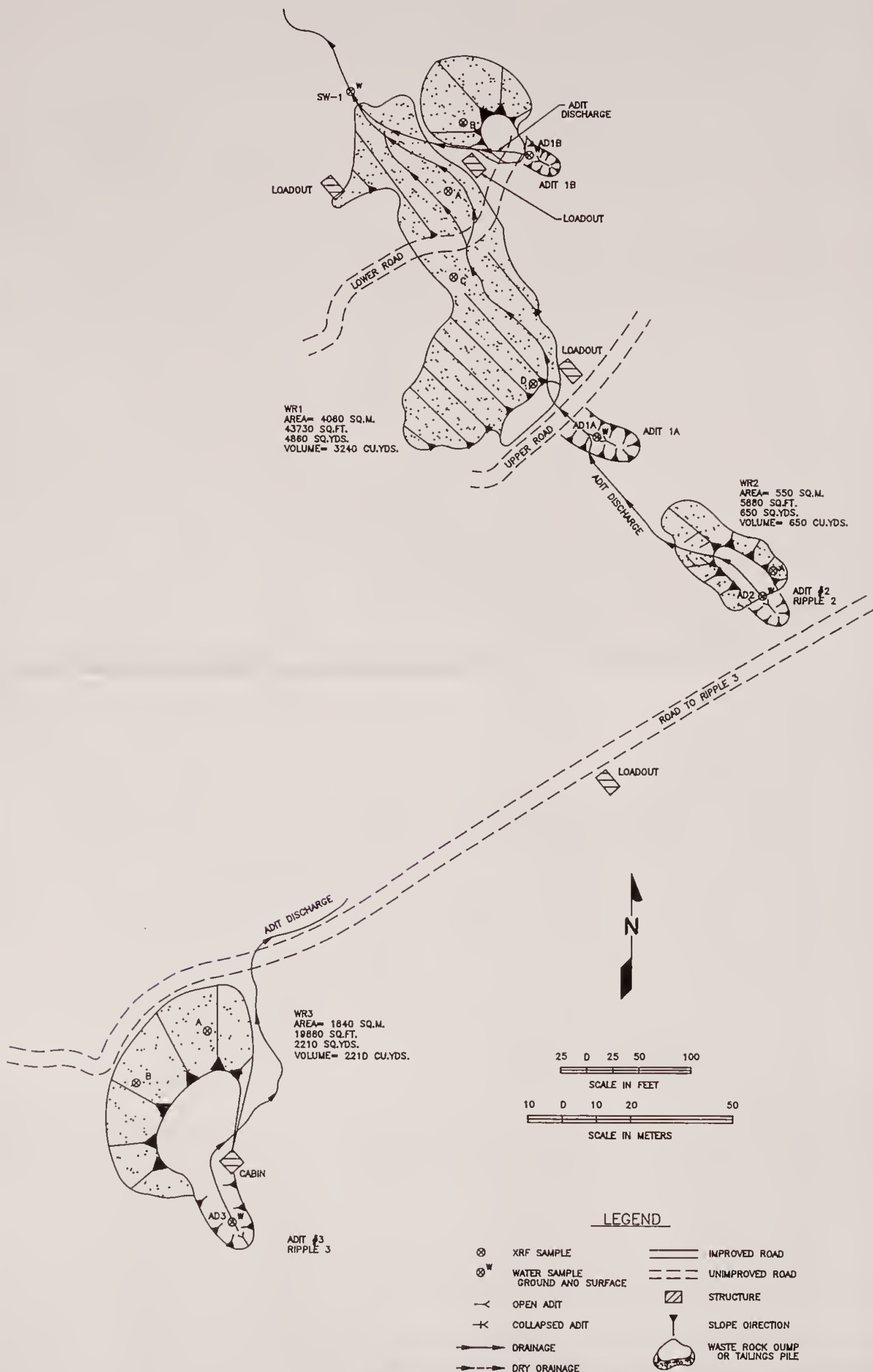


PIONEER
TECHNICAL SERVICES, INC.

RIPPLE MINES, P.A. NO. 07-163

T14N, R08E, SECTION 15

SCALE: 1" = 1000'



II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger, West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	3,240	Center of large dump near bottom	None	6.0 (D)	0.07	07-163-WR-1	06/07/94 1600	T-Metals, ABA
WR-1B	WR		Small dump to the east of main dump	None	4.8 (D)	0.07			
WR-1C	WR		West side of center of large dump	None	6.7 (D)	0.07			
WR-1D	WR		Top center of large dump	None	5.0 (D)	0.06			
WR-2	WR	650	Top center of small upper dump	None	< 3.5 (D)	0.05	N/A	N/A	XRF Analysis
WR-3A	WR	2,210	East side of northwest dump	None	4.4 (D)	0.06	07-163-WR-3	06/07/94 1600	T-Metals, ABA
WR-3B	WR		West side of northwest dump	None	5.0 (D)	0.05			
SS-1	SOIL		Background soil at the headwaters of Snow Creek	N/A	N/A	N/A	07-163-SS-1	06/09/94 1630	T-Metals

*Direct reading (calorimeter); R-decimated Paste (Orion Meter)

Comments or deviations from SOPs: 07-163-WR-1 is composite of WR-1A through -1D. 07-163-WR-3 is composite of WR-3A and -3B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 4 Identification: Adits #1A, #1B, #2 and #3

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes X, No , Number: 1 Identification: Base of WR-4 at loadout structure

Groundwater wells within 4 miles?: Yes X, No ;
Number of well logs: 7

Distance to nearest well used for drinking:
 <1,000 ft; 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Dumps are uncontained with low pH and high metals concentrations; adit
discharge flows over dump material.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: The discharge from Adit #2 flowed over WR-2
and into the discharge associated with Adit #1A; this may contribute to
the low pH of Adit #1A discharge.

GROUNDWATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as CaCO ₃	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
AD-1A	AD	Discharge from adit associated with WR-1A	7 gpm (E)	3.66	115	N/A	6.6	0	N/A	07-163-AD-1A	06/07/94 1315	T-Metals, TDS, Hardness, Cl, SO ₄ , NO ₂ /NO ₃
AD-1B	AD	Discharge from adit associated with WR-1B	4 gpm (E)	6.64	72	N/A	1.9	0	N/A	07-163-AD-1B	06/07/94 1030	T-Metals, TDS, Hardness, Cl, SO ₄ , NO ₂ /NO ₃
AD-2	AD	Discharge from adit associated with WR-2	3 gpm (E)	6.86	390	N/A	6.0	0	N/A	07-163-AD-2	06/07/94 1230	T-Metals, TDS, Hardness, Cl, SO ₄ , NO ₂ /NO ₃
AD-3	AD	Discharge from adit associated with WR-3	5 gpm (E)	5.85	520	N/A	8.3	0	N/A	07-163-AD-3	06/07/94 1200	T-Metals, TDS, Hardness, Cl, SO ₄ , NO ₂ /NO ₃

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes____, No X, Name(s): _____

Other surface water: Yes X, No____, Name(s)/Description: Adit discharges from four adits

Waste materials within any floodplain: Yes____, No X Source ID(s): _____

Approximate Flood frequency? ____1 yr, ____10 yr, ____100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No____, Describe: Adit discharges onto WR-1A, -1B, -2, and -3.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Belt Creek has fishery, recreation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No____. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000 X. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Stream channel below the site contains waste rock and iron precipitates.

SAMPLERS: Belanger, West

[illegible]

LOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None due to steep slope

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; ___1,000 ft - 0.5 miles; X>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger, West

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NOISE)
WR-1	FE0X; SO3; pH	Dry	43,730	43,730	Yes	Low
WR-2	FE0X; SO3; pH	Dry	5,880	5,880	Yes	Low
WR-3	FE0X; SO3; pH	Dry	19,860	19,860	Yes	Low
AD-1A	FE0X; pH	N/A	N/A	N/A	N/A	N/A
AD-1B	FE0X	N/A	N/A	N/A	N/A	N/A
AD-2	FE0X	N/A	N/A	N/A	N/A	N/A
AD-3	FE0X	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe:_____

Population within 1 mile: 1-10____; 10-30 X; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply):____ Easily accessible - no fences, gates, or warning signs; X Moderately Accessible - barbed wire fences, road gated, or signs posted;____ Difficult Access - chain-link fence, road gated and locked, site guarded (does not include locked or manned access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium____, Low X

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 3, types and locations:____
Adits #1A, #1B, and #2_____

Hazardous structures: Yes X, No____, Number 2, types and locations:____
Loadout at WR-4; cabin at WR-3_____

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 4, types and locations: WR-1, -2, -3, and -4 are very steep
and unstable._____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Ripple Mine, Prepared by Chen-Northern, October 18, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Ripple No. 3, Prepared by Chen-Northern, October 24, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**RIPPLE MINES
PA NO. 07-163**

Ripple Mines PA# 07-163
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/07/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-163-WR1	105 J	687	156	8.47 JX	1.8 UJ	1.31	89.3 J	34400	1.12	396 J	5.5	6920 JX	13.5 J	1670	NR
07-163-WR3	77 J	391	459	2.83 JX	1.4 UJ	1.21	184 J	25300	0.83	163 J	1.32 U	6270 JX	4.9 UJ	515	NR
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		SULFUR ACID BASE		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR		SULFUR	
	%	U/1000t	NEUTRAL POTENT.	POTENT.	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	%	U/1000t	POTENT.	U/1000t
07-163-WR1	1.09	34.1	0.37	-34	0.62	-34	0.09	2.81	0.38	2.81	0.09	2.81	0.38	2.81	-2.44	-1.77
07-163-WR3	1.28	40.0	-1.14	-41	1.17	-41	0.02	0.62	0.09	0.62	0.02	0.62	0.09	0.62	-1.77	-1.77

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-163-AD1A	0.15	115	22.6	30.6	9.8	4.7 UX	175	15500	0.11 U	5500	17.3	5.4	29.4 U	5530	47.9
07-163-AD1B	1.00	1.9	7.5	3.1	8.7 U	4.7 UX	36.9	765	0.11 U	431	8.0 U	42.0	29.4 U	505	31.6
07-163-AD2	0.27	3.1	10.3	2.6 U	8.7 U	11.3 JX	4.6 U	653	0.11 U	29.9	8.0 U	4.0	29.4 U	55.4	21.8
07-163-AD3	0.89	1.1	31.3	8.0	8.7 U	4.7 UX	73.5	665	0.11 U	1030	8.0 U	50.1	29.4 U	882	23.6
07-163-SW1	0.35	24.8	15.2	14.3	8.7 U	4.7 UX	103	3530	0.11 U	3180	8.0 U	33.4	29.4 U	3220	39.9

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-163-AD1A	138	<5	86	0.11	NR
07-163-AD1B	78	<5	22	0.16	NR
07-163-AD2	52	<5	6.0	0.14	NR
07-163-AD3	55	<5	22	0.26	NR
07-163-SW1	132	<5	61	0.18	NR

LEGEND

WR1 - Composite of subsamples WR1A through 1D.
WR3 - Composite of subsamples WR3A and 3B.
BACKGROUND - From the Ripple Mine (07-163-SS1).

AD1A - Discharge from adit associated with WR1A.
AD1B - Discharge from adit associated with WR1B.
AD2 - Discharge from adit associated with WR2.
AD3 - Discharge from adit associated with WR3.
SW1 - At confluence of Adits #1A and #1B discharges on dump WR1A.

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

XRF ANALYSIS RESULTS

**RIPPLE MINES
PA NO. 07-163**

Mine Name: Ripple Mines PA# 07-163
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-163-WR1A		27164.2	1509.22	1764		514.442 *	34293.1			139.824 *	2265.77		87.8249
07-163-WR1B		22321	7640.86	2603.49		2137.59	59228.4				1822.75		116.753
07-163-WR1C		32850.8	3095.21	2309.32		1183.63 *	51990.7				896.609		70.4329
07-163-WR1D		34175.9	2321.73	2776.85		1078.14 *	55617.1			94.9189 *	1051.03	275.124 *	103.878
07-163-WR1-COMP		32470.6	5300.06	2453.56		1567.85 *	53342.5			113.154 *	1045.6		112.547
07-163-WR2		42377.8	1550.79	3395.69		766.106 *	38946.7				161.592 *		77.597
07-163-WR3A		25917.8	11164	1409.32		868.802 *	40002.8			152.988 *	583.14		126.327
07-163-WR3B		45982.5	1238.26 *	3442.83		1425.39 *	33077.4			297.125 *	529.676		171.893
07-163-WR3-COMP		35132.9	5147.07	2283.41		877.952 *	34248.7			154.756 *	545.981		153.52

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-163-WR1A	131.833			6260.15	186.297			86.2485 *	1198.38	188.936 *		29.0759 *
07-163-WR1B	76.7527			7627.01	186.484				262.854	136.193 *		35.0742 *
07-163-WR1C	89.4134			6890.22	248.353				634.017	110.961 *		34.6094 *
07-163-WR1D	143.975			4912.3	237.849				320.236	157.199 *		
07-163-WR1-COMP	169.609			7019.42	246.771	168.878 *		77.3677 *	757.95	160.389 *		
07-163-WR2	149.332			1629.67	262.866				253.193			
07-163-WR3A	64.0163		16.044 *	5534	212.885			70.4006 *	1968.05	336.203 *		28.2398 *
07-163-WR3B	173.161			8484.95	241.606	163.216 *		88.517 *	3096.98			
07-163-WR3-COMP	122.982			6111.45	223.782	183.911 *			1535.73	244.745 *		

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**RIPPLE MINES
PA NO. 07-163**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

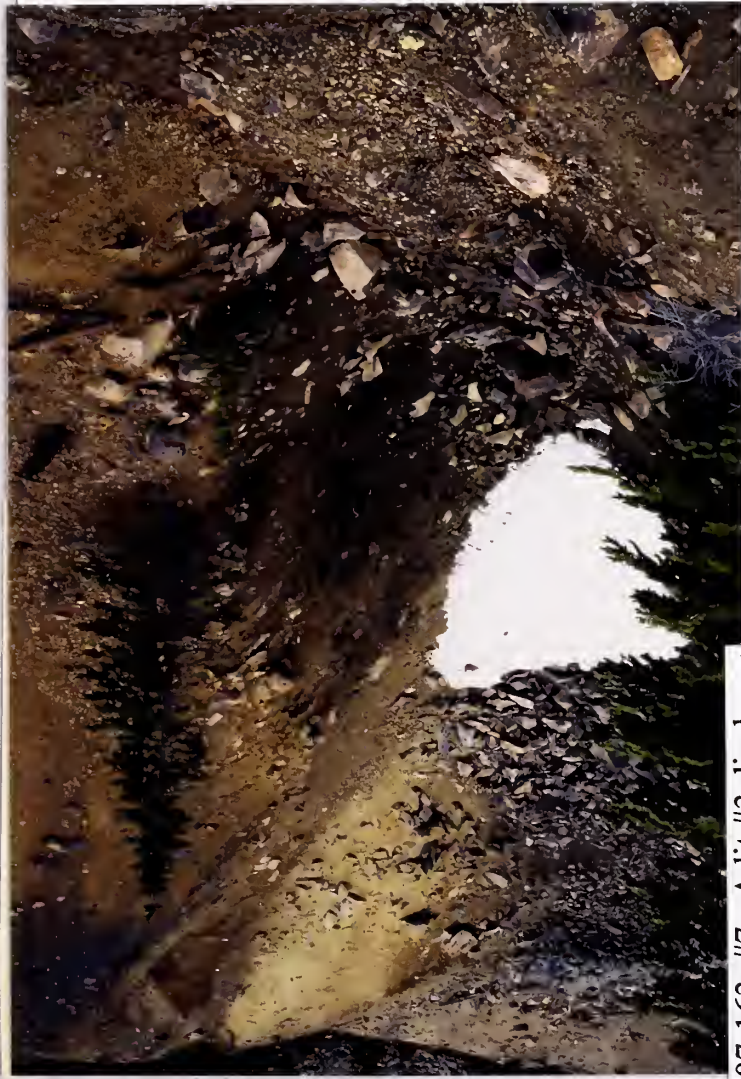
Ripple Mines
07-163

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 32.836
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	7
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 7.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 91941
SURFACE WATER PATHWAY			
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES	100
13A		CONTAINMENT	20
13B		DISTANCE TO SW	2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 140
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 36.402
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	1
18		WETLANDS	0
19		FISHERY	1
20		RECREATION	0
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 4
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 20385
AIR PATHWAY			
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	5
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 25
27		LIKELIHOOD SCORE	LINES 25 + 26C 25
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 1.612
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31		WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 30
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 1209
DIRECT CONTACT PATHWAY			
36		OBSERVED EXPOSURE	0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	10
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 50
38		LIKELIHOOD SCORE	LINES 36 + 37C 50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 1.461
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	10
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	0
43		TARGETS SCORE	SUM LINES 40 THRU 42 10
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 731
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000		1.14

LINE NO.	SITE SAFETY			10
	THREAT	ACCESSIBILITY		
1				
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	150
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	230
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	23.00

SITE NAME:
PA NUMBER:

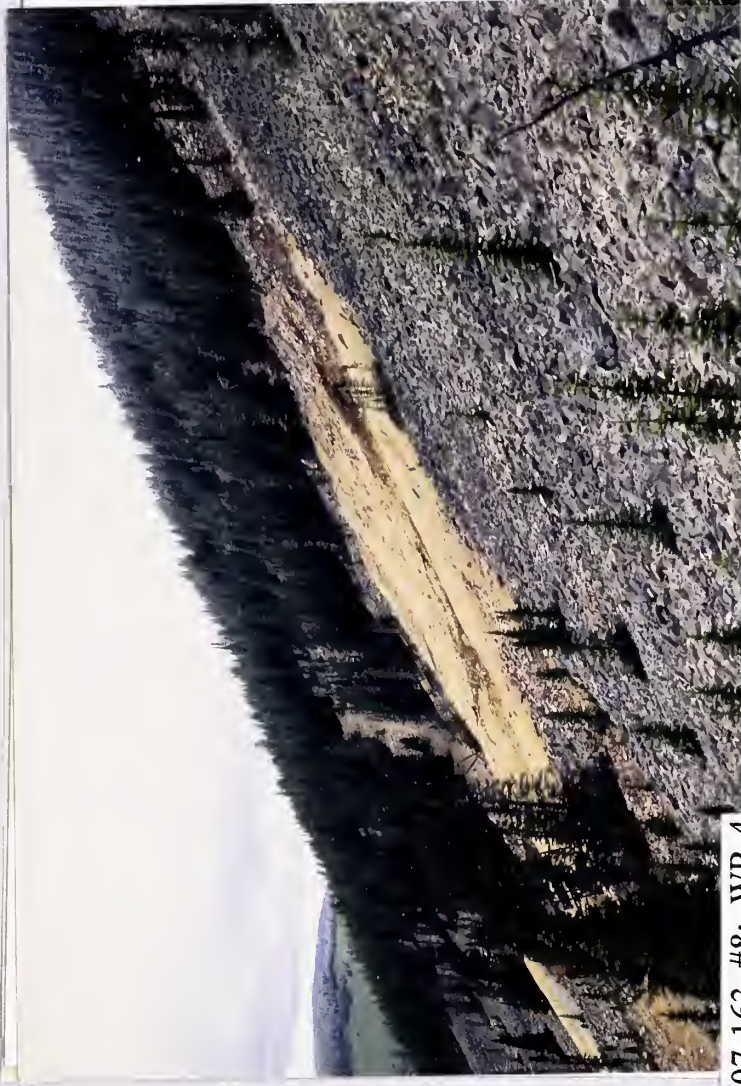
Ripple Mines
07-163



07-163, #7: Adit #3 discharge



07-163, #9: Adit #2 discharge



07-163, #8: WR-4



07-163, #10: Adit #1 (HMO)



07-163, #11: Adit #1 discharge



07-163, #12: WR-1B (left) and WR-1A (right)



07-163, #13: WR-1A, WR-2, and WR-4



07-163, #14: WR-1A, WR-2, and WR-4



07-163, #15: WR-2 and discharge



07-163, #16: WR-3 at Ripple No. 3

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: LEXINGTON NO. 4 PA#: 07-167

Date: June 9, 1994 Time: 1340-1600

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: Earl McCurley, MDSL/AMRB
Tim Pfahler, MDSL Helicopter Pilot

Weather/Seasonality Observations: Cool; partly cloudy; no wind;
spring/summer runoff.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #15: WR-1 and
helicopter; #16: Adit discharge (associated with WR-1); #17: Aerial
view of WR-1 and WR-2. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Abundant sulfides present on dumps.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Divert adit
discharge permanently around dump; revegetate dump.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LEXINGTON NO. 4 PA#: 07-167

Legal Description: T 14N ; R 8E ; Sec. 28 , SW 1/4 NE 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 50" Longitude: W 110° 42' 35"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Snow Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Gold

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y X N ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Hatfield, Great Falls, MT.

Relationship to other mines/sites in the area/district: Northwest of the Big Seven mine (07-156).

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 7300' , Slope 28° ,
Aspect North

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other(Specify)

Area of disturbed/unvegetated lands? 1 acre(s) .

Site Dimensions: 200 feet x 200 feet

Predominant vegetation types: Douglas fir, Lodgepole pine

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites). Locked gate on Snow Creek - fly in.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are 3
wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also
note presence of radioactive minerals). Site is underlain by diorite and pre-
Beltian gneiss. Ore appears to be a breccia cemented by sulfides.
Headwaters of an unnamed tributary to Snow Creek is north of the
site. Water leaving the site would flow north to confluence with
Snow Creek 1 mile north, and from there, into Carpenter Creek 1/4
mile northwest of that. Carpenter Creek flows west into Belt
Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Ore was
shipped to either East Helena or the Black Eagle plant. Ore
minerals identified are galena, sphalerite, pyrite, chalcopyrite,
and tetrahedrite.

Mine Operation?

Shafts - Yes , No X, # , Comment
Adits - Yes X, No , # 4, Comment #1 & #2 were not
investigated; #3 & #4 are
caved; #4 is discharging.

Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes , No X, # , Comment

Mill Operation? Yes , No X. If yes answer the next three
questions:

Period(s) of Operation: N/A

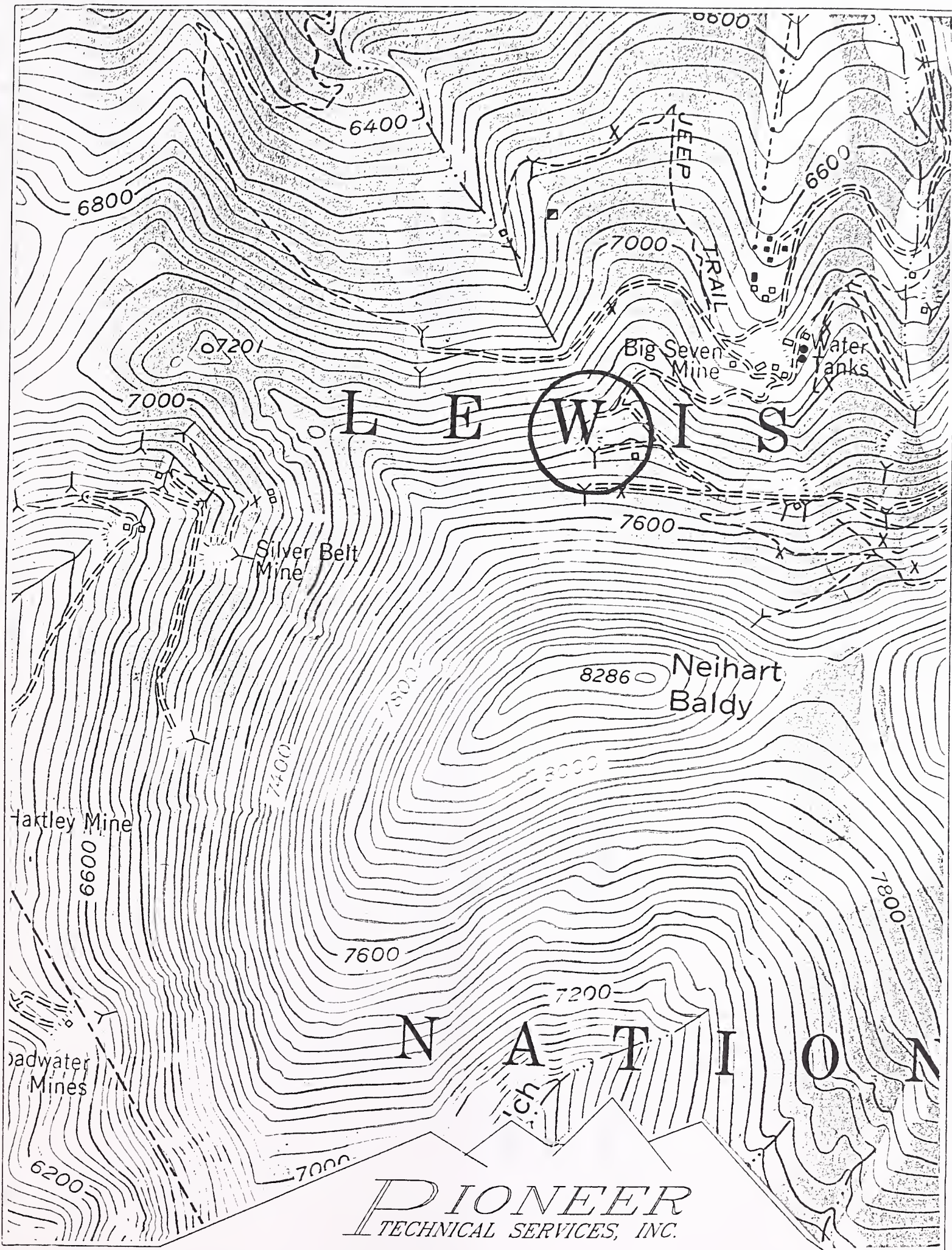
Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and
names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

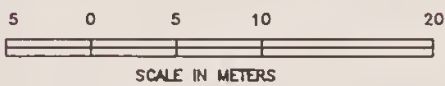
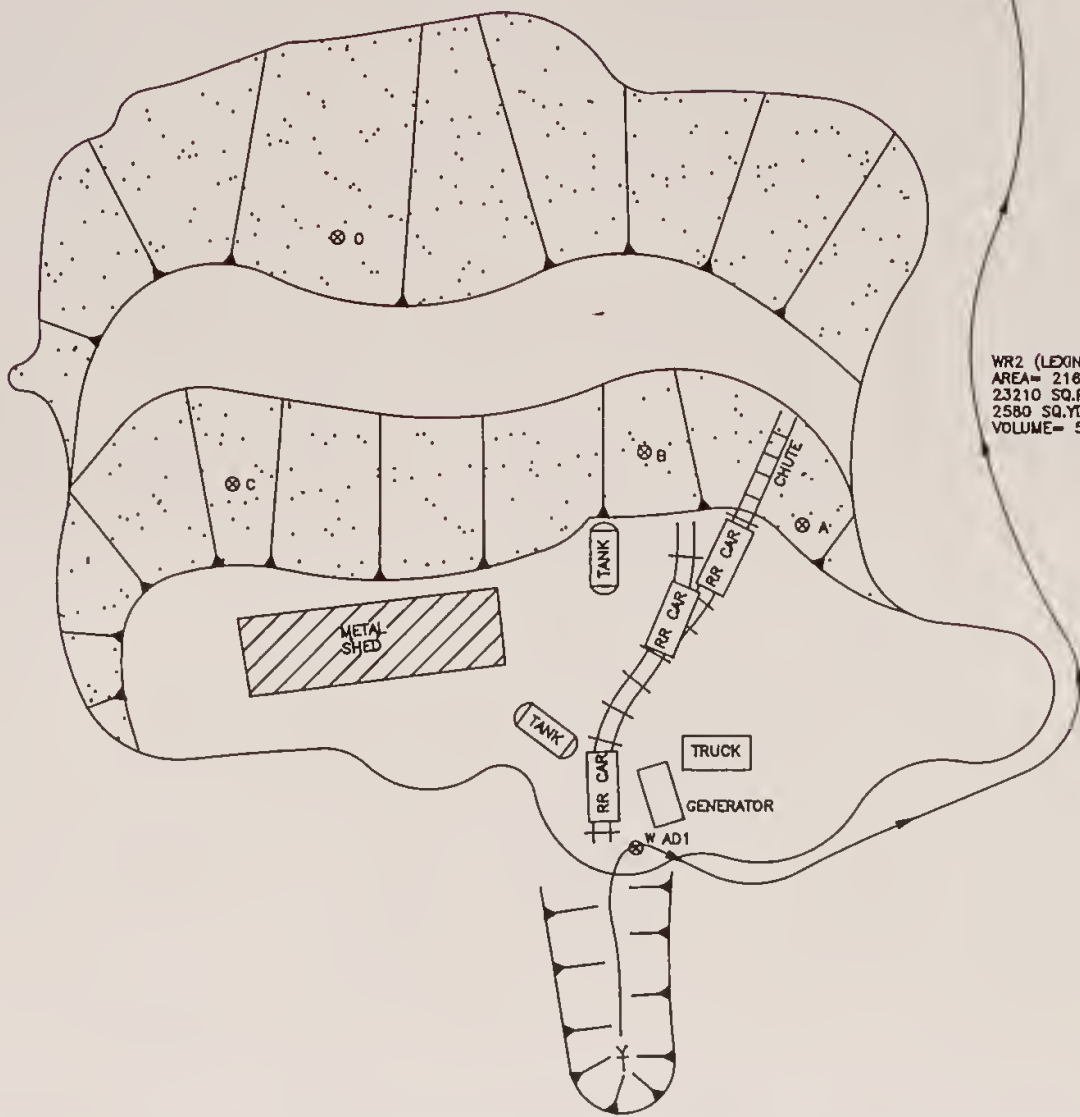
Well No.	Location	Depth	Yield	Static Water Level
.123062	14N 08E 20 DBA	41.0	4.0	24.00
M:123061	14N 08E 20 DBA	40.0	7.0	0.00
M:25649	14N 08E 32 BDC	120.0	8.0	7.00



LEXINGTON NO. 4, P.A. NO. 07-167

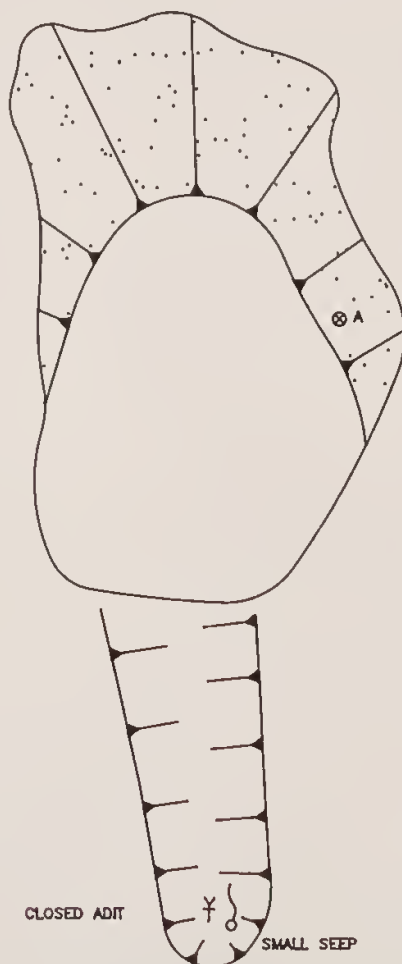
T14N, R08E, SECTION 28

SCALE: 1" = 1000'



LEGEND

- | | | | |
|--------|---------------------------------|-------|----------------------------------|
| ⊗ | XRF SAMPLE | == | IMPROVED ROAD |
| ⊗ | WATER SAMPLE GROUND AND SURFACE | - - - | UNIMPROVED ROAD |
| Y | OPEN ADIT | ▨ | STRUCTURE |
| X | COLLAPSED ADIT | ▽ | SLOPE DIRECTION |
| → | DRAINAGE | ⬢ | WASTE ROCK OUMP OR TAILINGS PILE |
| - - -> | DRY DRAINAGE | | |



DRAWN FOR:

PIONEER
 TECHNICAL SERVICES, INC.

TITLE:

LEXINGTON #4
 PA# 07-167

DRAWING NO.: PT340247
 DATE: 11/15/04

REV: --
 PLOT SCALE: 1 = 10

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SAMPLERS: Tuesday, West

D-Direct reading (Kelway Meter) ; S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-167-WR-1 is composite of WR-2A through -2D. See Ripple Mines (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 1 Identification: Lexington No. 4 adit discharge (AD-1)

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes , No X, Number: Identification:

Groundwater wells within 4 miles?: Yes X, No ;

Number of well logs: 8

Distance to nearest well used for drinking:

 <1,000 ft; 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Much of discharge seeps into dump. Dump is uncontained with high metals and sulfides.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: N/A

SAMPLERS: Belanger

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes____, No X, Name(s): _____

Other surface water: Yes X, No____, Name(s)/Description: Adit discharge flows downhill from dump.

Waste materials within any floodplain: Yes____, No X Source ID(s): _____

Approximate Flood frequency? ____1 yr, ____10 yr, ____100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)? 10 feet; adit flows mostly to the side of dump except at the mouth of the adit.

Surface water draining onto or through waste sources: Yes X, No____, Describe: Adit discharge flows over top of dump for short distance (30 feet).

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Belt Creek has fishery, recreation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000____.

Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): _____

SAMPLERS: Belanger

[illegible]

NOTES: 1) The number of points is 10.

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None due to steep hillside.

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X; 30-100___;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; ___1,000 ft - 0.5 miles; X>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, West

[illegible]

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10____; 10-30 X; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply):____ Easily accessible - no fences,
gates, or warning signs; X Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium____, Low X

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes X, No____, Number 1, types and locations:____
Shed at Lexington No. 4

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 3, types and locations: WR-1, WR-2, and caved Adit #4 are at
angle of repose.

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Form 39, Lexington, Cascade County, 1966, 1968-1969, 1972, and 1975.

MBMG, Marketing Problems of Small Business Enterprises Engaged in Lead and Zinc Mining, Bulletin 30, Written by F.M. Young, F.A. Crowley, and U.M. Sahinen, 1962.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Lexington No. 4, Prepared by Chen-Northern, October 25, 1989.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**LEXINGTON NO. 4
PA NO. 07-167**

Lexington No. 4 PA# 07-167
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/09/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-167-WR1	18.9 J	316	37.3	10.8 JX	5.35	7.31 J	46.8 J	36400	0.19	1170 J	8.7	2410 JX	6.8	2850	NR
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE U/1000t	NEUTRAL POTENT. U/1000t	SULFUR ACID BASE POTENT. U/1000t	SULFATE %	SULFUR ACID BASE POTENT. U/1000t	PYRITIC SULFUR ACID BASE U/1000t	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE POTENT. U/1000t	SULFUR ACID BASE POTENT. U/1000t
07-167-WR1	1.51	47.2	8.95	-38	0.86	0.25	0.40	7.81	1.14	

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
07-167-AD1	0.33	18.5	2.1	9.1	8.7 U	4.7 UX	23.1	2900	0.11 U	1770	8.0 U	96.8	29.4 U	1840	48.4
07-167-SW1	0.12 U	1.1 U	5.7	5.4	8.7 U	4.7 UX	4.6 U	36.4	0.11 U	234	8.0 U	4.5	29.4 U	1090	37.5

U - Not Detected, J - Estimated Quantity, X - Outlier for Accuracy or Precision, NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-167-AD1	96	<5	34	0.06	NR
07-167-SW1	73	<5	35	<0.05	NR

LEGEND

WR1 - Composite of subsamples WR2A, 2B, 2C, and 2D.
BACKGROUND - From the Ripple Mine (07-163-SS1).

AD1 - Lexington #4 Air discharge.
SW1 - Air discharge below dump and across road.

XRF ANALYSIS RESULTS

LEXINGTON NO. 4
PA NO. 07-167

Mine Name: Lexington No.4 PA# 07-167
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-167-WR1		33500 \$	1620 \$	2610 \$	76 \$	450 \$	38660 \$	230 \$	148 \$	64 \$	1068 \$		22 \$
07-167-WR1-COMP		20994.4	9531.82	3985.35		1268.8 *	48040.9				1680.32	288.824 *	143.184
07-167-WR2A	190 \$	15120 \$	2080 \$	4490 \$		380 \$	35860 \$	210 \$		92 \$	607 \$	500 \$	115 \$
07-167-WR2B		19870 \$	8940 \$	5440 \$		290 \$	75340 \$	600 \$		101 \$	3135 \$	278 \$	162.8 \$
07-167-WR2C		30720 \$	14780 \$	3520 \$		4870 \$	34970 \$		213 \$		524 \$	41 \$	247.3 \$
07-167-WR2D	2770 \$	21460 \$	16710 \$	2220 \$	85 \$	1890 \$	50300 \$	530 \$	212 \$	168 \$	798 \$	235 \$	114.5 \$

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-167-WR1	223 \$		6.7 \$	12520 \$	247 \$				200 \$	71 \$		24 \$
07-167-WR1-COMP	128.785			2140.41	178.666			23 \$	532.812			
07-167-WR2A	130 \$		3.1 \$	1771 \$	155.2 \$				345 \$	129 \$		11.4 \$
07-167-WR2B	84.2 \$		3.3 \$	2419 \$	179 \$	88 \$			315 \$	61 \$		18.6 \$
07-167-WR2C	143.1 \$			203 \$	206 \$	102 \$			707 \$		17.7 \$	13.4 \$
07-167-WR2D	147.5 \$			2367 \$	151 \$				420 \$	47 \$	10.4 \$	19.9 \$

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**LEXINGTON NO. 4
PA NO. 07-167**

AIMSS SCORESHEET

SITE NAME:

Lexington

PA NUMBER:

07-167

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI	5
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD	EXCEEDENCES	0
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	0
19	SW - TARGETS	FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31	AIR - TARGETS	WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	0
37A	LIKELIHOOD OF	ACCESSIBILITY	10
37B	EXPOSURE	DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	10
41	TARGETS	NEAREST RESIDENCE	0
42		RECREATIONAL USE	0
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		0.83

LINE
NO.

SITE NAME:
PA NUMBER:

Lexington
07-167

SITE SAFETY		
1	THREAT	ACCESSIBILITY
2		OPEN SHAFTS 100 EA.
3		OPEN ADITS 50 EA.
4	HAZARDS	UNSTAB. HIWALLS / PITS 75 EA.
5		HAZ. STRUCTURES 40 EA.
6		EXPLOSIVES
7		HAZ. MATERIALS
8		HAZARDS SCORE SUM LINES 2 THRU 7
9		POPULATION - 1 MILE
10	TARGETS	NEAREST RESIDENCE
11		RECREATIONAL USE
12		TARGETS SCORE SUM LINES 9 THRU 11
13		SITE SAFETY SCORE (LINES 1 x 8 x 12) / 1,000

10
0
0
0
40
0
0
40
10
0
0
10
4.00



07-167, #15: WR-1



07-167, #16: Adit discharge



07-167, #17: Aerial view of WR-1 and WR-2

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: HUTCHINSON PA#: 07-177

Date: June 7, 1994 Time: 1450-1700

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Overcast; breezy; cool;
intermittent sun.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: Adit and
discharge; #18: WR-1. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): The dump is fully vegetated with grasses, trees, and shrubs and
appears to not be impacting Snow Creek. Dump is 50 feet from Snow
Creek and out of floodplain.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: None;
completely revegetated; minor discharge flows down road.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): HUTCHINSON PA#: 07-177

Legal Description: T 14N ; R 8E ; Sec. 22 , NW 1/4 SW 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 57' 33" Longitude: W 110° 42' 09"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Snow Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district:
Approximately 0.5 mile north of the Upper and Lower Rebellion mines
and approximately 1.25 miles south of the Emma mine.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 6600' , Slope 20° ,
Aspect South

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 0 acre(s) .

Site Dimensions: 20 feet x 20 feet

Predominant vegetation types: Lodgepole pine

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites). Up
Snow Creek Road before the locked gate

Well logs within 1 mile radius; (Attach MEMG Well Log Printout(s)): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The mine is on the north side of the Snow Creek drainage. Snow Creek flows west past the site to confluence with Carpenter Creek approximately 1 mile west of the site. Carpenter Creek flows southwest to Belt Creek. Site is underlain by Carpenter Creek porphyry and pinto diorite.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes ☐, No ☒, # , Comment

Adits - Yes ☒, No ☐, # 1, Comment Locked, timbered, and has small discharge

Pits - Yes ☐, No ☒, # , Comment

Placers - Yes ☐, No ☒, # , Comment

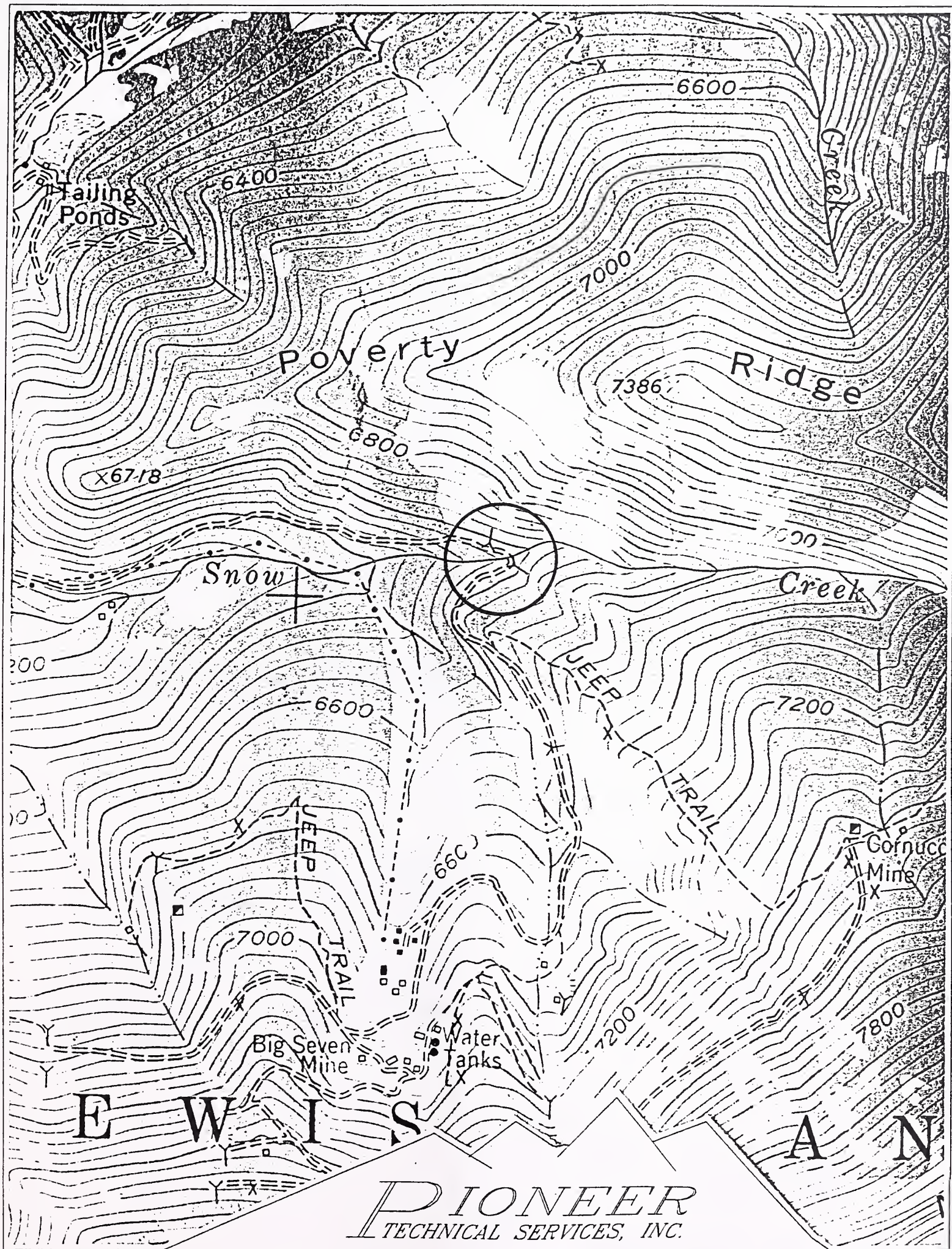
Other - Yes ☐, No ☒, # , Comment

Mill Operation? Yes ☐, No ☒. If yes answer the next three questions:

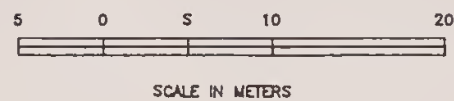
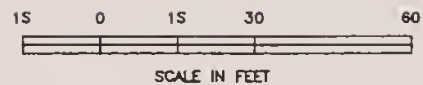
Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill ☐ Dedicated Mill ☐; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A

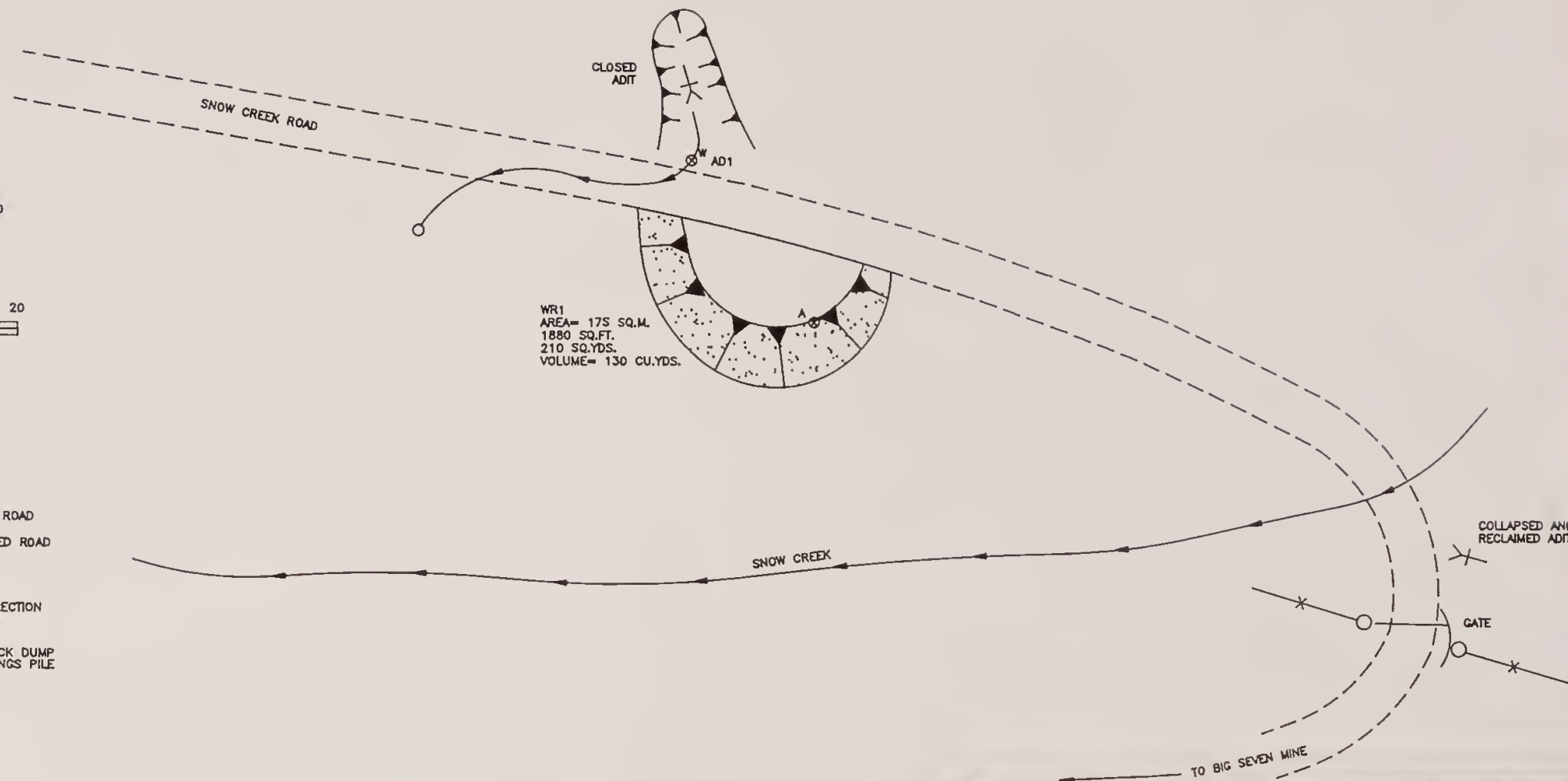


HUTCHINSON, P.A. NO. 07-177
T14N, R08E, SECTION 22
SCALE: 1" = 1000'



LEGEND

- | | | | |
|----------------|------------------------------------|-----------|-------------------------------------|
| ⊗ | XRF SAMPLE | ===== | IMPROVED ROAD |
| ⊗ ^W | WATER SAMPLE
GROUND AND SURFACE | - - - - - | UNIMPROVED ROAD |
| Y | OPEN ADIT | ==== | CULVERT |
| +K | COLLAPSED ADIT | ▽ | SLOPE DIRECTION |
| → | DRAINAGE | | WASTE ROCK DUMP
OR TAILINGS PILE |
| - - - - - | DRY DRAINAGE | | |
| * * * | FENCE | | |



DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

HUTCHINSON
PA# 07-177

DRAWING NO.: PT340210
DATE: 10/30/94

REV: -
PLOT SCALE: 1 = 10

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay):
N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SAMPLERS: Tuesday

[illegible]

p-Direct reading (Kelway Meter) ; N-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: This subsample was only analyzed by the XRF. See Ripple Mine (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: 1 Identification: Adit #1,
which is locked and has a wooden door (right next to road)

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes , No X, Number: Identification:

Groundwater wells within 4 miles?: Yes X, No ;

Number of well logs: 9

Distance to nearest well used for drinking:

 <1,000 ft; 1,000 ft to 0.5 miles; X >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Waste rock contained metals just above expected background; however,
groundwater in contact with adit walls and may contain metals.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: The discharge from Adit #1 flowed down the
road then seeped into the ground; it never entered Snow Creek and was a
considerable distance from the creek.

SAMPLERS: Belanger

[illegible]

Flow: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Snow Creek is approximately 50 feet from the site.

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes , No X, Name(s)/Description:

Waste materials within any floodplain: Yes , No X Source ID(s):

Approximate Flood frequency? 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: , Average Flow:

Distance between waste source(s) and nearest surface water body (ft)? >50 feet

Surface water draining onto or through waste sources: Yes , No X, Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Belt Creek has fishery, recreation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes , No X. Distance downstream (ft)? 0-500 ; 500-1,000 ; >1,000 . Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SAMPLERS:

[illegible]

4 (M) POINTEUR IO (2) POINTEUR : 5072

Comments or Deviations from the SOPs (Pioneer SAP, 1993): :

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 3 acres of open area

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; ___1,000 ft - 0.5 miles; X>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

SAMPLERS: Tuesday

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe: _____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments _____

Evidence of recreational use on site: Yes X, No____, Describe: Camping
at Snow Creek

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment _____
Wilderness Area - Yes____, No X, Comment _____
T&E Species Habitat - Yes____, No X, Comment _____
Bat Habitat - Yes____, No X, Comment Adit gate is solid.

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____
Wetlands Frontage - High____, Medium____, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:____
Adit could be potentially hazardous if door was circumvented.

Hazardous structures: Yes____, No X, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations: _____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations: _____

Fire and/or Explosion hazards: Yes____, No X, Explain: _____

Bibliography

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0,
Prepared by Montana Natural Resource Information System, December
1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for
Hutchinson Mine, Prepared by Chen-Northern, October 27, 1989.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**HUTCHINSON
PA NO. 07-177**

Hutchinson PA# 07-177
 AMRB HAZARDOUS MATERIALS INVENTORY
 INVESTIGATOR: PIONEER - TUESDAY
 INVESTIGATION DATE: 06/07/94

WATER MATRIX ANALYSES

Metals in Water
 Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn (mg CaCO3/L)	HARDNESS CALC.
07-177-AD1	0.12 U	1.1 U	6.5	5.0	8.7 U	4.7 UX	30.2	744	0.11 U	139	8.0 U	1.3	29.4 U	108	38.4

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
 Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-177-AD1	103	<5	48	0.13	NR

LEGEND

AD1 - Discharge from adit #1.

XRF ANALYSIS RESULTS

**HUTCHINSON
PA NO. 07-177**

Mine Name: Hutchinson PA# 07-177
 XRF Field Analyses
 Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-177-WR1		17762.4	6176.69	4454.83			42235.5				70.2288 *		293.66
XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th	
07-177-WR1	235.876			105.869 *	157.5				726.779			17.9548 *	

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**HUTCHINSON
PA NO. 07-177**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Hutchinson
07-177

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.145
6	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
7		WELLS - 1 TO 4 MI	9
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8 9.0
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 522
SURFACE WATER PATHWAY			
11		OBSERVED RELEASE	0
12		EXCEEDENCES	0
13A	SW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.165
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	0
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 8
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 264
AIR PATHWAY			
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	1
26B		DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 5
27		LIKELIHOOD SCORE	LINES 25 + 26C 5
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.000
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31		WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 30
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 0
DIRECT CONTACT PATHWAY			
36		OBSERVED EXPOSURE	0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	20
37B		DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 100
38		LIKELIHOOD SCORE	LINES 36 + 37C 100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	1
41		NEAREST RESIDENCE	0
42		RECREATIONAL USE	5
43		TARGETS SCORE	SUM LINES 40 THRU 42 6
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 0
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		(LINES 10 + 24 + 35 + 44) / 100,000 0.01

SITE NAME:
PA NUMBER:

Hutchinson
07-177

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	0
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	0.00



07-177, #17: Adit and discharge



07-177, #18: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: SNOW CREEK MILLSITE PA#: 07-505

Date: July 11, 1994 Time: 1100-1600

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Bisch, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Breezy; warm; clear.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #20: SW-1/SE-1
sample location, downgradient Snow Creek; #21: SW-2/SE-2 sample
location, upgradient Snow Creek; #22: Collapsed mill structure;
#23: TP-2 from south; #24: TP-2 from west; #25: TP-1 and cyanide
vat at mill; #26: Collapsed mill. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Small mill; very small volume of tailings. Site is referred to as
the IXL/Eureka Mill in literature.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove
tailings and dispose at an off-site repository, or revegetate on-
site.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SNOW CREEK MILL PA#: 07-505

Legal Description: T 14N ; R 8E ; Sec. 21 , SE 1/4 NW 1/4 SW 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 57' 30" Longitude: W 110° 43' 10"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Snow Creek/Carpenter Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Cyanide Mill/Gold, Silver

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y X N ; private/public? Public

Owner, Agent, or Contact (Include address and phone when available): USFS

Relationship to other mines/sites in the area/district: East of Carpenter Creek Tailings; west of Hutchinson; north of IXL and Eureka Mines.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 6200' , Slope 10° ,
Aspect Southwest

Land use: Mining X , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 0.25 acre(s) .

Site Dimensions: 200 feet x 50 feet

Predominant vegetation types: Lodgepole pine, aspen, willow

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites).
Located along Snow Creek Road, past Carpenter Creek Tailings.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are 2 wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by the Snow Creek porphyry; pinto diorite float is present on-site. Valley floor is shallow with many seeps and bogs. Snow Creek flows past site to Carpenter Creek approx. 1 mile downstream. Carpenter Creek has confluence with Belt Creek approx. 3 miles downstream.

Mining/milling history, ore type/tenor, host rock, gangue: Ore from the IXL/Eureka Mines was processed before 1897. A 10-stamp mill operated briefly in 1905 or 1906. Tenor is 0.25 oz/ton gold and 9.4 oz/ton silver. Ore minerals are silver sulfides and manganese oxides with some native silver; disseminated ores in Snow Creek porphyry.

Mine Operation?

Shafts - Yes___, No X, # ___ , Comment___
Adits - Yes___, No X, # ___ , Comment___
Pits - Yes X, No___, # 3 , Comment Minor diggings on hillside
Placers - Yes X, No___, # ___ , Comment Possible in dry drainages near the site
Other - Yes___, No X, # ___ , Comment___

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: 1905 to 1906

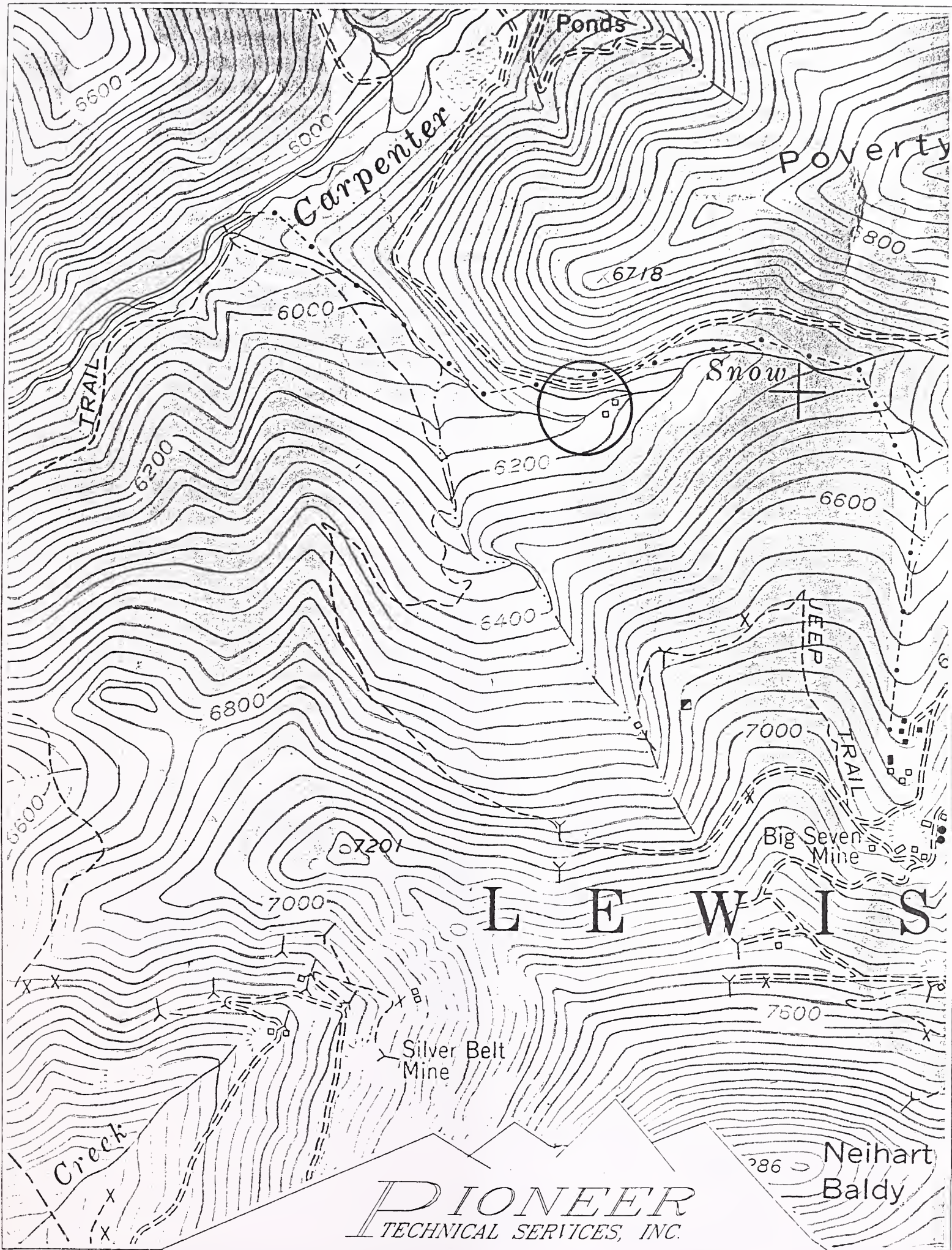
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: IXL and Eureka Mines; possibly others

Process? Hg-amalgam, CN leach (vat, heap), floatation, smelting?
CN- vat leach; 10-stamp mill and cyanide plant

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

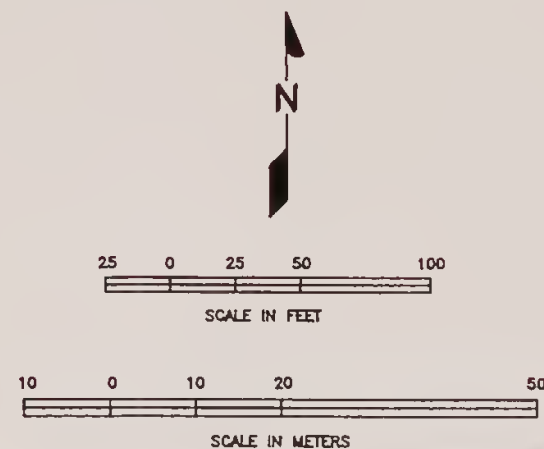
Well No.	Location	Depth	Yield	Static Water Level
123062	14N 08E 20 DBA	41.0	4.0	24.00
123061	14N 08E 20 DBA	40.0	7.0	0.00



SNOW CREEK MILLSITE, P.A. NO. 07-505

T14N, P08E, SECTION 21

SCALE 1" = 100'



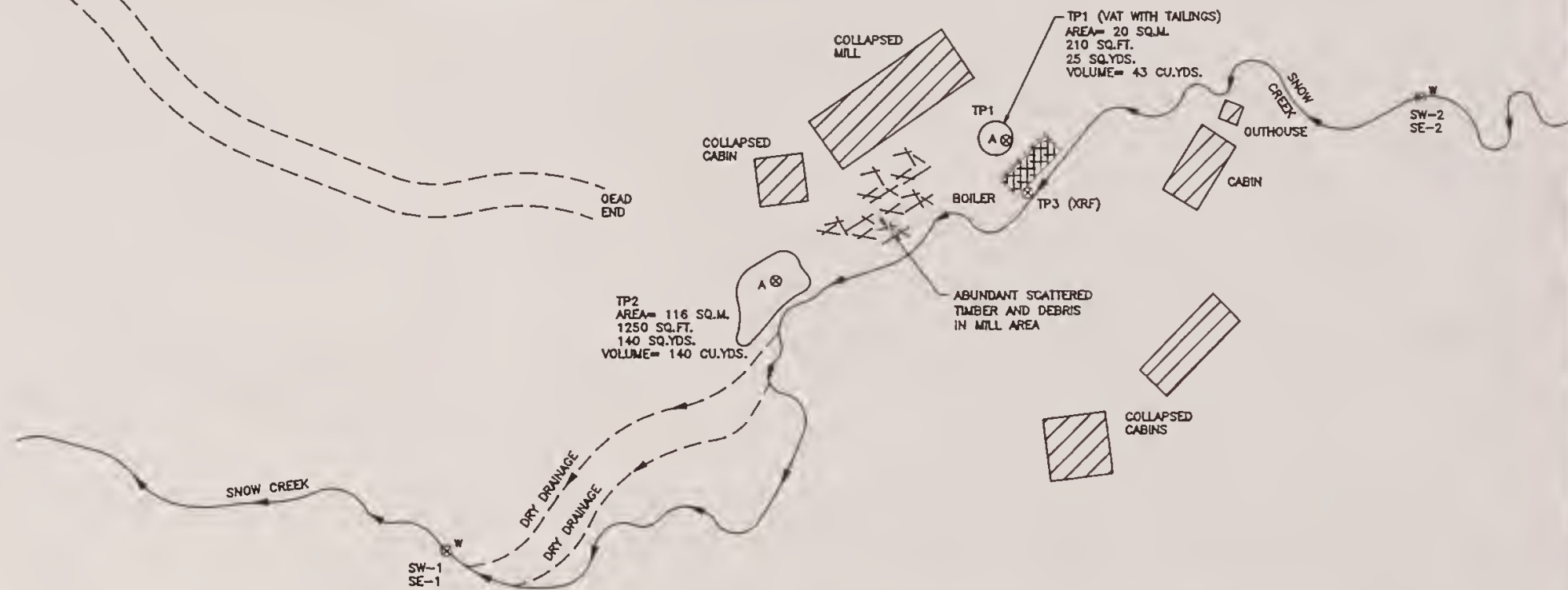
SNOW CREEK ROAD

ROAD (BAD CONDITION)

DEAD END

LEGEND

- ⊗ XRF SAMPLE
- ⊗^W WATER SAMPLE GROUND AND SURFACE
- DRAINAGE
- - - DRY DRAINAGE
- ===== IMPROVED ROAD
- - - UNIMPROVED ROAD
- ▨ STRUCTURE
- ▼ SLOPE DIRECTION
- ⬮ WASTE ROCK DUMP OR TAILINGS PILE



DRAWN FOR: PIONEER TECHNICAL SERVICES, INC.	TITLE: SNOW CREEK MILL PA# 07-505	
	DRAWING NO.: PT340229 DATE: 10/24/94	REV: - PLOT SCALE: 1 = 20

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 50% sand, 50% silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): 5.4' deep in vat; 6.6' maximum depth in uncontained tailings pile. Homogeneous, no stratification noticeable.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry on surface (1 to 2.5' depth); moist below.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): TP-1 is contained in deteriorating 16.5' diameter wooden vat. TP-2 is uncontained and in Snow Creek floodplain.

Comments on potential for mitigation: Remove tailings from site for consolidation with other nearby reclamation projects. Very small volume of tailings associated with the site.

SOURCE INVENTORY FORM

SAMPLERS: Bisch

[illegible]

b-Direct reading (Kelway Meter) / S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 07-505-TP-1 is composite of TP-1A and -1B, and TP-2A and -2B. See Ripple Mine (07-163) for the background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:_____

Filled shafts: Yes___, No X, Number:___ Identification:_____

Seeps/Springs: Yes X, No___, Number: 2 Identification: One near SW-2/SE-2; one on south side of drainage near buildings

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 13

Distance to nearest well used for drinking:

___<1,000 ft;___1,000 ft to 0.5 miles; X>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible X, Unlikely___.

Shallow groundwater, but few tailings and moderate metals concentrations.

Approximate Depth to Groundwater: X<25 ft;___ 25 - 100 ft;___ >100 ft.

Other observations/notes: N/A

SAMPLERS:

[illegible]

NOTE: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Snow Creek

Dry streambeds: Yes , No X, Name(s):

Other surface water: Yes , No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No Source ID(s): TP-2

Approximate Flood frequency? 1 yr, X 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 1.75 cfs

High Flow: 7.5 cfs, Average Flow: 1.5 cfs

Distance between waste source(s) and nearest surface water body (ft)? 10 feet from TP-2 to Snow Creek

Surface water draining onto or through waste sources: Yes , No X, Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishery (Belt Creek), wetlands, and possible irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes , No X. Distance downstream (ft)? 0-500 ; 500-1,000 ; >1,000 .

Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): There is iron oxide staining on stream rocks up and downstream.

SAMPLERS: Tuesday

[illegible]

4 (M) persons to (2) persons: 40%

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 acre

Wetlands present: Yes X, No , Describe: Along Snow Creek (narrow)

Carbonate rocks/soils: Yes , No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ; 10-30 ; 30-100 X;
100-300 ; 300-1,000 ; 1,000-3,000 ; 3,000-10,000 ; 10,000 or
greater ; Comments

Nearest residence: <1,000 ft; 1,000 ft - 0.5 miles; X >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
 observed high moderate low none

SAMPLERS: Bisch

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:_____

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes____, No X, Describe:_____

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage____; Secondary Drainage X; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium____, Low X

Fisheries Habitat and Species Classification - 4

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes____, No X, Number____, types and locations:_____

Hazardous structures: Yes X, No____, Number 2, types and locations:_____
Cabin and partially collapsed mill

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Geology and Ore Deposits of the Neihart Mining District, Cascade County, Montana, Memoir 13, Written by Paul A. Schafer, July 1935.

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Forms for Upper and Lower West Eureka and Lower IXL, Prepared by Chen-Northern, October 26, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for IXL-Eureka, Prepared by Daphne Digrindakis, June 13, 1985.

USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.

USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**SNOW CREEK MILLSITE
PA NO. 07-505**

Snow Creek Mill PA# 07-505
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/11/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-505-SE1	0.6 UX	21.8 J	187	8.5	11.5	10.6	35.5	15900	0.03 UJ	2700	20.8	142	6.5 UJ	1850	NR
07-505-SE2	2.0 JX	13.0 J	76.8	6.6	11.4	9.8	31.6	13600	0.03 UJ	2090	19.3	136	6.4 UJ	1540	NR
07-505-TP1	78.6 JX	25.9 J	7.2	1.3	1.5 U	2.6	61.7	5200	0.24 J	90.7	1.8	962	55.7 J	775	3.552
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	ACID BASE U/1000t	NEUTRAL POTENT. U/1000t	SULFUR ACID BASE POTENT. U/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE U/1000t	SULFUR ACID BASE POTENT. U/1000t
07-505-TP1	0.21	6.56	1.47	-5.1	0.04	<0.01	0.17	0.00	1.47

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-505-SW1	0.12 U	1.9	13.6	4.7	8.7 U	4.7 U	4.6 U	99.9	0.08 U	23.2	8.0 U	1.6	29.4 U	882	64.1
07-505-SW2	0.12 U	2.2	14.9	2.6 U	8.7 U	4.7 U	4.6 U	77.7	0.08 U	24.9	11.4	1.3	29.4 U	903	65.1

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-505-SW1	104	<5	45	0.07	NR
07-505-SW2	83	<5	45	0.06	NR

LEGEND

SE1 - Snowcreek below millsite.
 SE2 - Snow creek above millsite.
 TP1 - Core points of subsamples TP1A, 1B, 2A, and 2B.
 BACKGROUND - From the Eagle Mine (07-163-SS1).

SW1 - Same as sample 07-505-SE1.
 SW2 - Same as sample 07-505-SE2.

XRF ANALYSIS RESULTS

**SNOW CREEK MILLSITE
PA NO. 07-505**

Mine Name: Snow Creek Millsite PA# 07-505

XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-505-TP1A		24266.3	2138.07	270.149 *		370.426 *	6898.82				1638.83		10.7912 *
07-505-TP1B		28235.2	2123.56	334.603 *		705.304 *	6458.5				1178.89		12.4453 *
07-505-TP1-COMP		26161.1	2162.22	283.478 *	207.192 *	445.478 *	8497.71				1004.8		24.2662 *
07-505-TP2A		38348.9	1692.21	618.594		502.625 *	10037.5			88.197 *	289.164		28.3441 *
07-505-TP2B		28743	1615.76	231.162 *		8768.51				77.7804 *	320.39		20.3025 *
07-505-TP3		19170.4	3360.5	1924.86		597.532 *	27200.5	481.284 *			1044.71		346.834

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-505-TP1A	68.4564			675.66	163.329			118.131 *	83.2561 *		52.9505 *	81.5693
07-505-TP1B	82.8648			593.598	181.072			101.563	104.951		55.982 *	71.9099
07-505-TP1-COMP	69.8876			885.991	179.591			81.8603 *	155.457	95.0135 *	55.8773 *	75.4216
07-505-TP2A	99.881			1092.16	259.581			63.8435 *	232.749	129.365 *	62.8901 *	88.5163
07-505-TP2B	81.8402			909.891	224.413			95.2839 *	225.585	156.217 *	48.5286 *	62.1006
07-505-TP3	343.289		11.7198 *	2924.58	112.523	305.718 *	150.478 *	162.281 *	13437.8	207.964 *		

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**SNOW CREEK MILLSITE
PA NO. 07-505**

AIMSS SCORESHEET

SITE NAME:

Snow Creek Mill

PA NUMBER:

07-505

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	5.0
7	GW - TARGETS	WELLS - 1 TO 4 MI	11
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD	EXCEEDENCES	50
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18	SW - TARGETS	WETLANDS	10
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31	AIR - TARGETS	WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	0
37A	LIKELIHOOD OF	ACCESSIBILITY	20
37B	EXPOSURE	DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	1
41	TARGETS	NEAREST RESIDENCE	0
42		RECREATIONAL USE	0
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		0.02
	(LINES 10 + 24 + 35 + 44) / 100,000		

SITE NAME:
PA NUMBER:

Snow Creek Mill
07-505

LINE
NO.

SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	80
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	1.60



07-505, #20: SW-1 and SE-1 sample location



07-505, #21: SW-2 and SE-2 sample location



07-505, #22: Collapsed mill structure



07-505, #23: TP-2 from south



07-505, #24: TP-2 from west



07-505, #25: TP-1 and cyanide vat at mill



07-505, #26: Collapsed mill

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: QUEEN OF THE HILLS PA#: 07-085

Date: June 8 and 10, 1994 Time: 1330-1620/0800-1000

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Clark, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Partly sunny; cool; occasional
showers; slight breeze.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #18, #19: Adit #2
discharge; #20: WR-2 and loadout; #21: WR-1 and part of loadout;
#22: WR-1 and loadout (from road by highway); #23: WR-1; #27: Shaft
at WR-1; #28: Loadout and possible mill at WR-1; #29: Adit #5
(HMO); #30: Adit #5 (Note: Intermittent discharge, seep); #31: WR-4
and WR-5; #32: Adits #3 and #4 on WR-3; #33: WR-2 from WR-3; #34:
WR-3 from road facing south. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Tailings from mills operated at this location may have been
disposed of at the Neihart Tailings site (PA #07-154) located
approximately 1/4 mile north of this site on Belt Creek.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Recontour and
revegetate (some already occurring naturally); divert adit
discharge around dump.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): QUEEN OF THE HILLS PA#: 07-085

Legal Description: T 14N ; R 8E ; Sec. 29 , SE 1/4 SW 1/4 1/4

County: CASCADE Mining District: NEIHART

Latitude: N 46° 56' 19" Longitude: W 110° 44' 25"

Primary Drainage Basin and Code: Belt Creek/10030105

Secondary Drainage Basin: Rock Creek

USGS Quadrangle map name(s): Neihart

Mine Type/Commodities: Hardrock/Silver, Lead, Zinc

Activity Status: Active, Inactive/Exploration X, Abandoned.

Ownership: Known Y X N; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Alicia, Vic, and Charles Campbell, Neihart, MT.

Relationship to other mines/sites in the area/district: Southwest of the Florence Mine, approximately 1/4 mile; east of the Molton Mine, approximately 1/4 mile.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 5600'-6100', Slope 30°,
Aspect Western

Land use: Mining, Recreational X, Residential, Urban,
Agricultural, Other(Specify)

Area of disturbed/unvegetated lands? 10 acre(s).
Site Dimensions: 1,200 feet x 300 feet

Predominant vegetation types: Lodgepole pine/Douglas fir forest, willows

Access: roads - good (paved), poor (maintained dirt road),
4wd X, trail.

Other logistical considerations (proximity to other sites). Road to WR-2 is not accessible due to overgrown trees and shrubs; cable gate is down. Road to WR-3 and WR-4 is also inaccessible due to washout of road at the Moulton mine.

Well logs within 1 mile radius; (Attach MRMG Well Log Printout(s): There is 1
well reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also
note presence of radioactive minerals). The site is underlain by Pre-Beltian
gneisses and schists. Site lies in a dry drainage to Belt Creek.
Water leaving the site would flow southwest to Belt Creek
approximately 1/4 mile below the site. Belt Creek then flows to
the northwest.

Mining/milling history, ore type/tenor, host rock, gangue: The
site is the first claim to be located in the Neihart district in
July of 1881. The site was patented in June of 1884 and operated
until 1929. Production from 1901 to 1942 inclusive is reported at
130.78 oz. gold, 430,629 oz. silver, 4,872 lbs. copper, 2,037,465
lbs. lead, and 2,160,105 lbs. zinc from 41,358 tons of ore. Ore
minerals present are galena, sphalerite, pyrite, small amounts of
chalcopryrite and ruby silver. Gangue minerals are quartz,
ankerite, and barite. Barium sulfate is present to the extent of
37% in some ores.

Mine Operation?

Shafts - Yes X, No , # 1, Comment Fenced, deep, no water
Adits - Yes X, No , # 6, Comment 5 fully caved; 1 open;
Adit #2 is discharging.
Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes X, No , # 1, Comment Stope with subsidences

Mill Operation? Yes , No X. If yes answer the next three
questions:

Period(s) of Operation: A 60-ton selective floatation mill was
reported to have been constructed in 1942, but was later dismantled
and removed. No tailings were found during this investigation.

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and
names of mines that supplied mill feed: Not Determined

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Not Determined

Montana Bureau of Mines and Geology
Water Well Log Data

08/10/1994

Well No.	Location	Depth	Yield	Static Water Level
25649	14N 08E 32 BDC	120.0	8.0	7.00



PIONEER
TECHNICAL SERVICES, INC.

QUEEN OF THE HILLS, P.A. NO. 07-085

T14N, R08E, SECTION 29

SCALE: 1" = 1000'

WR5
AREA= 21650 SQ.FT.
2400 SQ.YDS.
VOLUME= 4800 CU.YDS.

WR4
AREA= 18200 SQ.FT.
2130 SQ.YDS.
VOLUME= 2130 CU.YDS.

WR3
AREA= 10230 SQ.FT.
1140 SQ.YDS.
VOLUME= 2280 CU.YDS.

NOT TO SCALE

LEGEND

- | | | | |
|-----|--------------------|-------|----------------------------------|
| ⊗ | XRF SAMPLE | ===== | IMPROVED ROAD |
| ⊗ | WATER SAMPLE | ----- | UNIMPROVED ROAD |
| | GROUND AND SURFACE | ===== | CULVERT |
| < | OPEN ADIT | ▨ | STRUCTURE |
| ⊥ | COLLAPSED ADIT | ⊗ | COLLAPSED TIMBERS |
| ⌢ | GATE | ⬮ | EXCAVATION |
| → | DRAINAGE | ▲ | SLOPE DIRECTION |
| → | DRY DRAINAGE | ⬮ | WASTE ROCK DUMP OR TAILINGS PILE |
| *** | FENCE | | |

WR2
AREA= 8300 SQ.FT.
1030 SQ.YDS.
VOLUME= 1030 CU.YDS.

WR1
AREA= 78840 SQ.FT.
8880 SQ.YDS.
VOLUME= 44,400 CU.YDS.

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

QUEEN OF THE HILLS
PA# 07-085

DRAWING NO.: PT34025B
DATE: 12/4/84

REV: -
PLDT SCALE: 1 = 100

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay):
N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (MR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1A	WR	44,400	Lower dump; south end, top	None	6.4 (D)	0.06	07-085-WR-1	06/10/94 1040	T-Metals, ABA
WR-1B	WR		Lower dump; middle, top	None	5.8 (D)	0.04			
WR-1C	WR		Lower dump; north end, top	None	5.4 (D)	0.04			
WR-2A	WR	1,030	Second dump up hill; near adit discharge	None	6.4 (D)	0.04	07-085-WR-2	06/10/94 1040	T-Metals, ABA
WR-2B	WR		Second dump up hill; south end	None	6.2 (D)	0.03			
WR-3	WR	2,280	Middle dump; center, near top	None	5.4 (D)	0.06	07-085-WR-3	06/10/94 1042	T-Metals, ABA
WR-4	WR	2,130	Second dump from top; center, in gully	None	5.4 (D)	0.045			
WR-5	WR	4,800	Upper dump; center, in gully	None	5.6 (D)	0.06			

D-Direct reading (halway meter); S-saturated paste (orion meter)

Comments or deviations from SOPs: 07-085-WR-1 is composite of WR-1A through -1C. 07-085-WR-2 is composite of WR-2A and -2B. 07-085-WR-3 is composite of WR-3, WR-4, and WR-5. See Ripple Mine (07-163) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No , Number: Identification: Adit #2

Filled shafts: Yes , No X, Number: Identification:

Seeps/Springs: Yes , No X, Number: Identification:

Groundwater wells within 4 miles?: Yes X, No ;

Number of well logs: 6

Distance to nearest well used for drinking:

 <1,000 ft; X 1,000 ft to 0.5 miles; >0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite , Probable , Possible X, Unlikely .

Discharge seeps into dump; metals in uncontained dumps at moderate concentrations.

Approximate Depth to Groundwater: X <25 ft; 25 - 100 ft; >100 ft.

Other observations/notes: N/A

SAMPLERS: Belanger

[illegible]

TOP: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Rock Creek, Belt Creek

Dry streambeds: Yes X, No , Name(s): Unnamed tributary of Belt Creek

Other surface water: Yes X, No , Name(s)/Description: Adit discharge

Waste materials within any floodplain: Yes X, No Source ID(s): WR-2, -3, -4, and -5 are in dry drainage.

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? < 0.01 cfs
High Flow: 0.1 cfs, Average Flow: Dry

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ,
Describe: Adit #2 discharge drains onto WR-2.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Agriculture, fishery, and recreation

Observed erosional/sedimentation/stream turbidity problems? Yes X, No . Distance downstream (ft)? 0-500 X; 500-1,000 ; >1,000 .
Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): 50 feet down drainage from WR-2

SAMPLERS:

[illegible]

4 (M) points to 10 (M) points: 100%

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 2 acres at the bottom near WR-1

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes___, No X, Describe:_____

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___;
100-300 X; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: X <1,000 ft; ___ 1,000 ft - 0.5 miles; ___ >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FE0X; SO3	Dry	79,940	63,950	Yes	Low
WR-2	FE0X	Dry	9,300	6,500	Yes	Low
WR-3	FE0X	Dry	10,230	9,210	Yes	Low
WR-4	FE0X	Dry	19,200	19,200	Yes	Low
WR-5	FE0X	Dry	21,650	10,825	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe: _____

Population within 1 mile: 1-10____; 10-30____; 30-100 X; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments _____

Evidence of recreational use on site: Yes X, No____, Describe: _____
Camping, shooting _____

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs; _____ Moderately Accessible - barbed wire fences,
road gated, or signs posted; _____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment _____
Wilderness Area - Yes____, No X, Comment _____
T&E Species Habitat - Yes____, No X, Comment _____
Bat Habitat - Yes____, No X, Comment _____

Primary Drainage____; Secondary Drainage X; No Information____:
Riparian Habitat Quality - High____, Medium X, Low____
Wetlands Frontage - High____, Medium____, Low X
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 4, types and locations:____
Adits #3, #4, and #5; shaft associated with WR-1

Hazardous structures: Yes X, No____, Number 5, types and locations:____
Loadout, mill, and cabin at WR-1; shed at WR-3; and, loadout at WR-2

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations: _____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 5, types and locations: All dumps are steep.

Fire and/or Explosion hazards: Yes____, No X, Explain: _____

Bibliography

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- MBMG, Well Log Database, July 14, 1994.
- MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.
- MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Queen of the Hills, Prepared by Chen-Northern, September 14, 1989.
- MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Queen of the Hills, Prepared by Daphne Digrindakis, June 13, 1985.
- USBM, Mines and Mineral Deposits (Except Fuels), Cascade County, Montana, Information Circular No. 7589, Written by Almon F. Robertson, April 1950.
- USGS, Topographic Map, Neihart, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

**QUEEN OF THE HILLS
PA NO. 07-085**

Queen of the Hills PA# 07-085
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/08 & 10/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
07-085-WR1	95.8 J	683	753	90.4 JX	19.4 J	5.86 J	229 J	54800	0.26	32800 J	34.7	13900 JX	40.1 J	21000	NR
07-085-WR2	48.7 J	172	570	49.6 JX	14.6 J	12.4 J	75.4 J	35700	0.33	13200 J	28.1	5700 JX	21.8 J	11500	NR
07-085-WR3	21.8 J	43.1	545	11.4 JX	11.9 J	19.9 J	27.1 J	13100	0.44	4410 J	19.5	1810 JX	6.5 J	2580	NR
BACKGROUND	0.5	9.6	87.6	1.32 JX	9.05 J	27.2 J	10.8 J	21100	0.04	708 J	10.3	52.4 JX	4.7 UJ	135	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR		NEUTRAL		SULFUR		PYRITIC		SULFUR	
	%	U/1000t	POTENT.	U/1000t	POTENT.	U/1000t	%	U/1000t	ACID BASE	POTENT.
07-085-WR1	3.35	105	38.5	-66	<0.01	1.57	2.00	49.0	-10.6	
07-085-WR2	1.31	40.9	36.5	-4.5	0.25	0.39	0.67	12.2	24.3	
07-085-WR3	0.17	5.31	11.1	5.80	0.11	0.01	0.05	0.31	10.8	

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
07-085-AD1	0.44	1.1 U	42.2	2.6 U	8.7 U	4.7 UX	4.6 U	34.2	0.11 U	57.8	8.0 U	1.8	29.4 U	1120	260

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD ID	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
07-085-AD1	331	<5	176	0.06	NR

LEGEND

WR1 - Composite of subsamples WR1A through 1C.
WR2 - Composite of subsamples WR2A and 2B.
WR3 - Composite of subsamples WR3, 4, and 5.
BACKGROUND - From the Apple Mine (07-163-SS1).

AD1 - Ads #2 discharge.

XRF ANALYSIS RESULTS

**QUEEN OF THE HILLS
PA NO. 07-085**

Mine Name: Queen of the Hills PA# 07-085
XRF Field Analyses
Results In PPM

XRF SAMPLE I.D.	CrHl	K	Ca	Tl	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
07-085-WR1A		24319.5	3300.31	952.605 *	326.875 *	46981.9	59993.4		347.95 *	497.915 *	12159.6		106.555
07-085-WR1B		24667	4449.6	2556.08		32650.2	40821.7		261.732 *	158.27 *	13704.2		85.6479
07-085-WR1C		29666	5195.57	2509.66		29014.7	45772.9		153.67 *		4905.66		84.1903
07-085-WR1-COMP		25584.9	4407.46	1902.3		36378.8	48513				13266.2		94.5061
07-085-WR2A	1109.43 *	27140.9	3934.76	981.732 *		32533.5	51168.6				8049.37		107.793
07-085-WR2B		24878.5	5915.05	2884.31		10895.8	38270.4				2786.01		175.972
07-085-WR2-COMP	711.046 *	27025	4770.56	2396.64		19135.8	47286.4				4042.4		119.534
07-085-WR3		30721.3	7645.3	3115.29		1372.96 *	17844.5				1786.3		338.067
07-085-WR3-COMP	470.052 *	23803.7	5989.56	2150.44		3001.73	18213.7				2465.63		269.408
07-085-WR4		32580.3	7339.57	4314.66		11210.7	40271.5		180.858 *	119.842 *	4845.19		208.357
07-085-WR5	678.761 *	34551.1	5869.11	3278.17		4821.28	19118.6				4252.48		188.8

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
07-085-WR1A	93.7872			15720.9	141.805	229.05 *		89.8188 *	5277.89	362.17 *		
07-085-WR1B	170.847			3629.18	167.449	159.648 *		74.682 *	4272.9			
07-085-WR1C	199.16			1641.05	188.748				1760.72	120.378 *		
07-085-WR1-COMP	135.496	111.194 *	12.9684 *	7567.34	157.317	222.225 *		112.062 *	5677.18	189.315 *		37.8949 *
07-085-WR2A	151.101		12.5648 *	5202.73	151.144	179.972 *		99.7916 *	5456.2	100.327 *		
07-085-WR2B	181.049			2352.79	154.666	126.587 *			1392.35			
07-085-WR2-COMP	165.026	81.996 *		4153.83	187.286	246.309 *			3140.76			
07-085-WR3	258.431			304.071	141.691				1869.73	85.8575 *		19.3566 *
07-085-WR3-COMP	187.075			938.106	131.848				1818.75			16.14 *
07-085-WR4	155.46			4411.13	159.569	174.203 *			4057.78	174.816 *		
07-085-WR5	155.34			1753.45	174.63				2084.3	100.073 *		18.5994 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**QUEEN OF THE HILLS
PA NO. 07-085**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Queen of the Hills
07-085

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT	20
3B		GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B 400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C 400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 473.182
6	GW - TARGETS	WELLS - 1 MI. x 2.5	2.5
7		WELLS - 1 TO 4 MI	5
8		NEAREST WELL	5
9		TARGETS SCORE	LINES 6 + 7 + 8 12.5
10		GROUNDWATER SCORE	LINES 4 x 5 x 9 2365910
SURFACE WATER PATHWAY			
11		OBSERVED RELEASE	0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES	0
13A		CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B 400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C 400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 520.834
16	SW - TARGETS	DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	0
18		WETLANDS	0
19		FISHERY	1
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22 8
24		SURFACE WATER SCORE	LINES 14 x 15 x 23 1666669
AIR PATHWAY			
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT	5
26B		DISTANCE TO POPULATION	20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B 100
27		LIKELIHOOD SCORE	LINES 25 + 26C 100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 2.005
29	AIR - TARGETS	POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	10
31		WETLANDS	0
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33 40
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34 8020
DIRECT CONTACT PATHWAY			
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY	20
37B		DISTANCE TO POPULATION	20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B 400
38		LIKELIHOOD SCORE	LINES 36 + 37C 450
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET) 1.823
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE	30
41		NEAREST RESIDENCE	10
42		RECREATIONAL USE	5
43		TARGETS SCORE	SUM LINES 40 THRU 42 45
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43 36916
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000		40.78

SITE NAME:

Queen of the Hills

PA NUMBER:

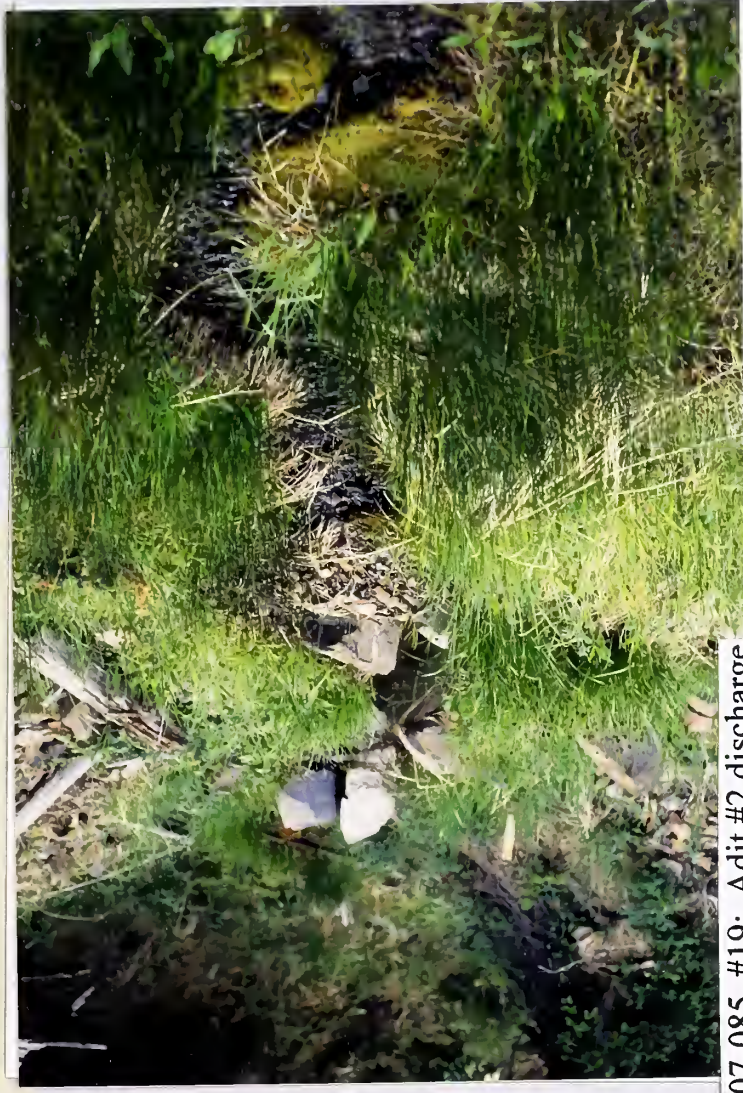
07-085

LINE
NO.SITE SAFETY

1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	150
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	200
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	450
9		POPULATION - 1 MILE		30
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	45
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	405.00



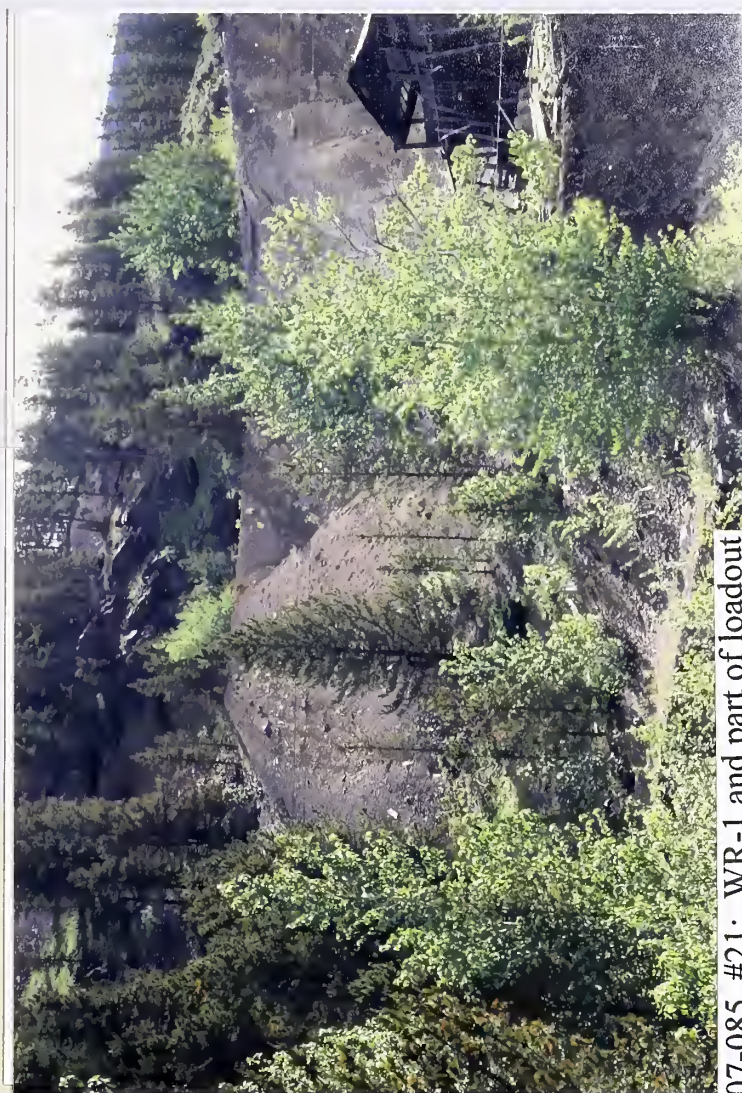
07-085, #18: Adit #2 discharge



07-085, #19: Adit #2 discharge



07-085, #20: WR-2 and loadout



07-085, #21: WR-1 and part of loadout



07-085, #22: WR-1 and loadout from road



07-085, #23: WR-1



07-085, #27: Shaft at WR-1



07-085, #28: Loadout and mill at WR-1



07-085, #29: Adit #5 (HMO)



07-085, #30: Adit #5 (Note: Seep)



07-085, #31: WR-4 and WR-5



07-085, #32: Adits #3 and #4 on WR-3



07-085, #33: WR-2 from WR-3



07-085, #34: WR-3 from road facing south

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: GILT EDGE TAILINGS PA#: 14-008

Date: July 14, 1994 Time: 0900-1530

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Bisch, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; breezy; dry.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: South end of upper tailings; #18: Middle of upper tailings and slag; #19: North end of upper tailings, TP-1A, and mill buildings; #20: Closed Adit #2 along road; #21: Cyanide building (full of core samples); #22: Impoundment and upstream Ox Frame Gulch toward SE-1 sample location; #23: Adit #1 (HMO) in Ox Frame Gulch (150 feet up); #24: TP-1B profile location; #25: Erosion gully in reclaimed tailings; #26: SW-3 sample location; #27: SW-2 sample location; #28: South half of site with mill and south end of TP-2 from east; #29: North end of TP-2; #30: TP-2 showing erosion gully; #31: Location north of TP-2 where tailings are entering creek; #32: West end of TP-2 and small adjacent piles (TP-2D); #33: Erosion gully to creek from top of pile; #34: Empty cyanide vats in mill area; #35: TP-2 from above and mill; #36: Outwash area to east. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Site consists of two separate mills and tailings. The early mill was just west of Gilt Edge, 1.5 miles from mine. Mill was not efficient and was eventually rebuilt, and tailings were reprocessed. Later a mill was built at the mine site. Those tailings have been reclaimed, but erosion problems persist. Lower tailings are semi-cemented with lime, but erode into Chippewa Creek.

Other Hazardous Materials/Substances Present: Some barrels in a locked building at the mine site; unknown contents.

General Comments on Potential Remedial Alternatives: Treat and contain lower tailings; revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GILT EDGE TAILINGS PA#: 14-008

Legal Description: T 16N ; R 20E ; Sec. 17 , SW 1/4 SW 1/4 1/4
T 16N ; R 20E ; Sec. 20 , SE 1/4 SE 1/4 1/4

County: FERGUS Mining District: WARM SPRINGS

Latitude: N 47° 07' 53" Longitude: W 109° 12' 29"

Primary Drainage Basin and Code: Chippewa Creek/10040204

Secondary Drainage Basin: Ox Frame Gulch/Chippewa Creek

USGS Quadrangle map name(s): Judith Peak

Mine Type/Commodities: Millsite/Gold, Silver, Lead, Copper

Activity Status: Active , Inactive/Exploration , Abandoned X .

Ownership: Known Y N X ; private/public? Private/Public

Owner, Agent, or Contact (Include address and phone when available): Possibly George Smith, Grass Range, MT; BLM

Relationship to other mines/sites in the area/district: Lower piles are west of the town of Gilt Edge. Upper tailings are up Chippewa Creek approx. 1 mile, located next to the Gilt Edge mine.

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? Upper tailings were reclaimed in 1986 by MDSL; however, erosion problems persist.

General site features: Elevation 4500'-4800', Slope 0-5°, Aspect East

Land use: Mining X , Recreational X , Residential X , Urban , Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 13 acre(s) .
Site Dimensions: 400 feet x 400 feet and 700 feet x 650 feet

Predominant vegetation types: Ponderosa pine, willows and Quaking aspen in drainages.

Access: roads - good (paved) , poor (maintained dirt road) , 4wd X , trail .

Other logistical considerations (proximity to other sites). Gilt Edge mine (14-007) is 1 mile up Chippewa Creek from lower tailings.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius according to the MBMG Well Log Database; however, a well was sampled in Gilt Edge approximately 1,500 feet from the lower tailings during this investigation.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Chippewa Creek is an intermittent stream flowing through the site. Upper tailings - 0 to 0.5 mile, Ox Frame Gulch; 0.5 to 15 miles, Chippewa Creek. Lower tailings - 0 to 15 miles, Chippewa Creek.

Mining/milling history, ore type/tenor, host rock, gangue: The original mill was built in 1892 and could treat 50 tons/day. In 1893, the mill was redesigned to treat 100 tons/day; the mill closed in 1897. In 1918, the tailings were re-treated with cyanide. The most recent period of gold production occurred in the early 1980s; cyanide heap leach process ceased in 1986. Gilt Edge mine is on the west side of the town of Gilt Edge. Ore occurs at contact of cretaceous intrusives and Madison limestone.

Mine Operation?

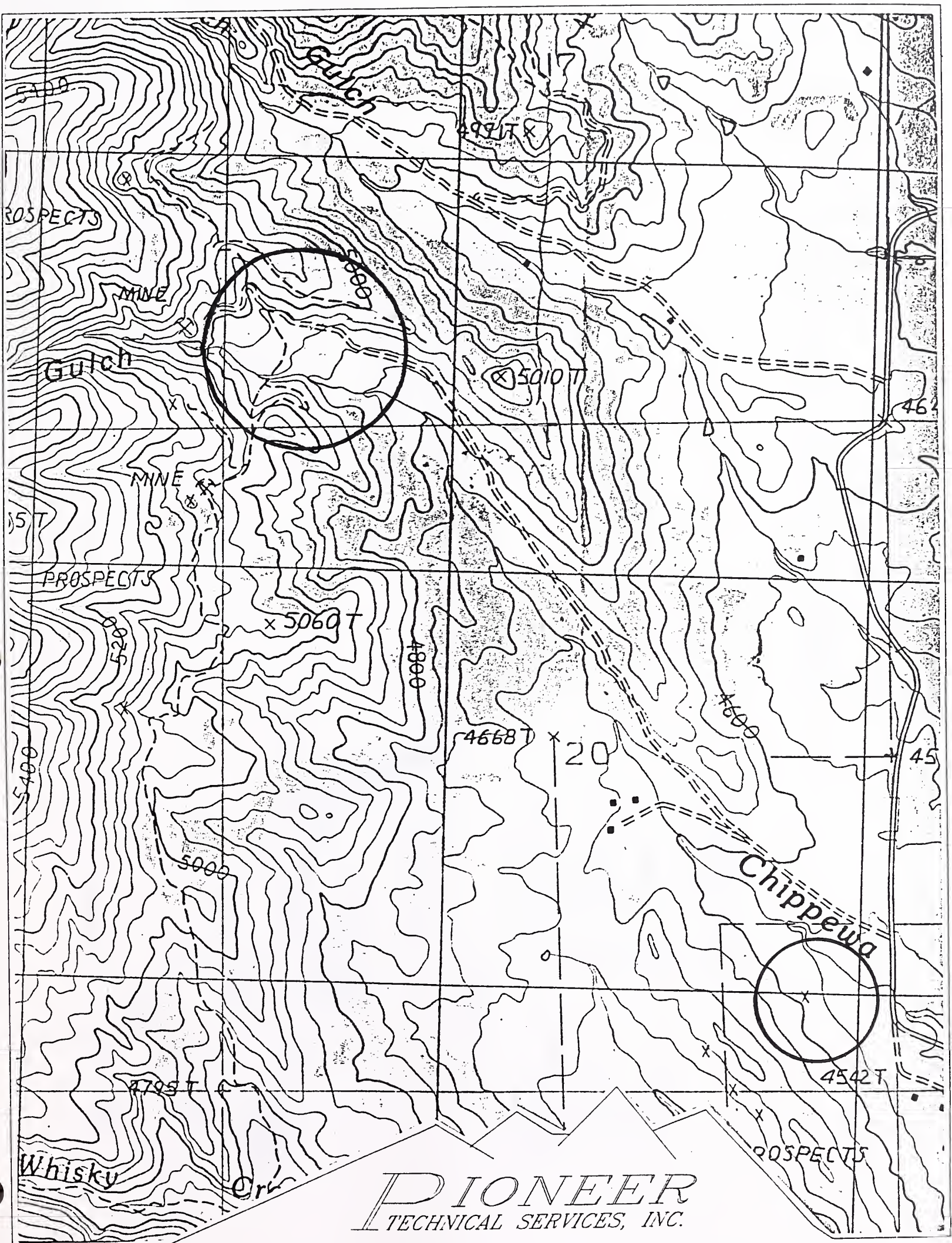
Shafts - Yes___, No X, # ___ , Comment _____
Adits - Yes X, No___, # 2 , Comment At mine site
Pits - Yes___, No X, # ___ , Comment _____
Placers - Yes___, No X, # ___ , Comment _____
Other - Yes X, No___, # ___ , Comment Tailings

Mill Operation? Yes X, No___. If yes answer the next three questions:

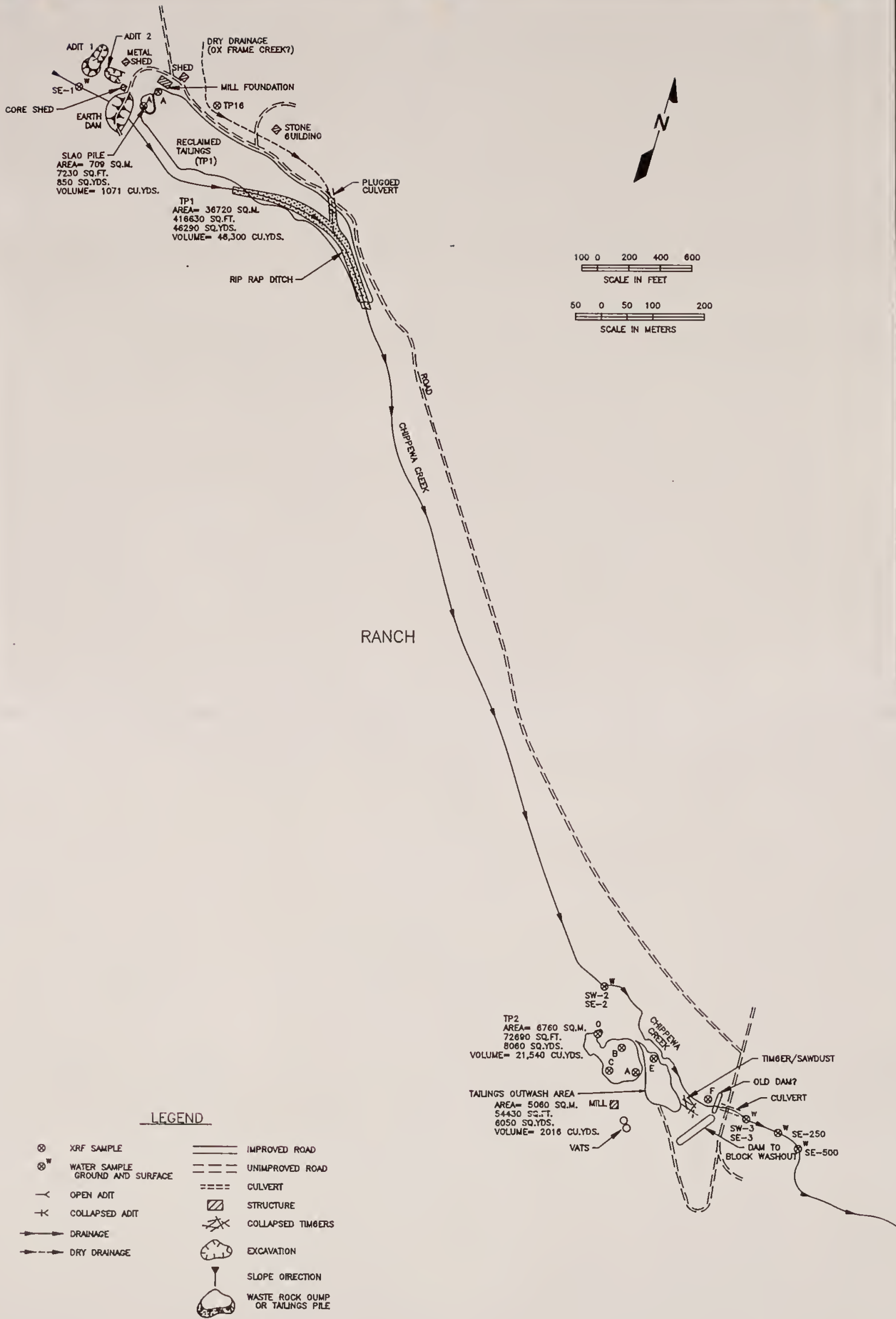
Period(s) of Operation: First mill at lower tailings was from 1892 to 1897. The second mill at upper tailings and mine operated until 1912.

Origin of Ore Milled - Custom Mill___ **Dedicated Mill** X; **Number and names of mines that supplied mill feed:** Processed ore from Gilt Edge mine.

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Cyanide plant is located adjacent to the Gilt Edge mine adit. Roasting equipment was installed in 1902. There are cyanide tanks at lower tailings also from reprocessing.



GILT EDGE TAILINGS, P.A. NO. 14-008
T16N, R20E, SECTION 20
SCALE: 1" = 1000'



DRAWN FOR:

PIONEER
 TECHNICAL SERVICES, INC.

TITLE:

GILT EDGE TAILINGS
 PA# 14-008

DRAWING NO.: PT340235
 DATE: 11/29/94

REV: --
 PLOT SCALE: 1 = 160

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): TP-1 is coarse sand and gravels (1/4"); TP-2 is silt and fine gravels (1/8").

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 is at least 9 feet deep near the mine; thins downstream to 3 feet. TP-2 is 20 feet at center of pile, with an average depth of approximately 5 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): TP-1 is dry; TP-2 is dry and semi-cemented.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No impoundments for either tailings.

Comments on potential for mitigation: Upper tailings are reclaimed but need run-on/run-off control to mitigate continued erosion. TP-2 is a pile needing containment and revegetation.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
TP-1A	TAIL	46,300	Reclaimed upper tailings; northwest side	None	6.2 (D)	0.03	14-008-TP-1	07/14/94 1430	T-Metals, ABA
TP-1B	TAIL		North side where gully has cut 6' into pile	None	6.2 (D)	0.03			
TP-2A	TAIL	21,540	Lower tailings; north side	None	4.4 (D)	0.02	14-008-TP-2	07/14/94 1445	T-Metals, ABA
TP-2B	TAIL		Northwest side	None	4.2 (D)	0.03			
TP-2C	TAIL		East side	None	5.1 (D)	0.04			
TP-2D	TAIL		Small pile adjacent to TP-2	None	5.2 (D)	0.03			
TP-2E	TAIL	2,020	Tailings that have eroded from TP-2	None	6.0 (D)	0.03			
TP-2F	TAIL		Small fine tailings adjacent to creek, possibly older tailings	None	5.5 (D)	0.03	N/A	N/A	XRF Analysis
SL-1	OTH	1,070	Slag pile on TP-1 near mine	None	< 3.5 (D)	0.02	N/A	N/A	XRF Analysis

D-Direct reading (beta Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 14-008-TP-1 is composite of TP-1A and -1B. 14-008-TP-2 is composite of TP-2A through -2E. See Prester John (14-090) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:___

Filled shafts: Yes___, No X, Number:___ Identification:___

Seeps/Springs: Yes___, No X, Number:___ Identification:___

Groundwater wells within 4 miles?: Yes X, No___;

Number of well logs: 0 (Database)

Distance to nearest well used for drinking:

___<1,000 ft; X 1,000 ft to 0.5 miles; ___>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable X, Possible___, Unlikely___.

Shallow groundwater in drainage; high arsenic in tailings; low metals.

Approximate Depth to Groundwater: X <25 ft; ___ 25 - 100 ft; ___ >100 ft.

Other observations/notes: Ranch located near drainage between TP-1 and
TP-2. Ranch appeared to be unoccupied. There are a couple of
residences in/near historical town of Gilt Edge. One home had a well,
which was sampled.

SAMPLERS: Tuesday, Bisch

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No , Name(s): Chippewa Creek

Dry streambeds: Yes X, No , Name(s): Ox Frame Gulch

Other surface water: Yes , No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No Source ID(s): TP-1 and TP-2 are in floodplain of Chippewa Creek.

Approximate Flood frequency? X 1 yr, 10 yr, 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 15 gpm

High Flow: 50 gpm, Average Flow: Dry to 10 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; TP-1 and TP-2 are cut by creek.

Surface water draining onto or through waste sources: Yes X, No , Describe: Chippewa Creek is adjacent to TP-2 and through TP-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands present; fishery in Chippewa Creek, and agricultural use.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No . Distance downstream (ft)? 0-500 ; 500-1,000 ; >1,000 X. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): TP-1 is eroded downstream approximately 3,000 feet to ranch.

SAMPLERS: Tuesday, Bisch

[illegible]

2 (M) perusem so (3) potestis: EOLIA

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Abundant marshy/swampy areas in Chippewa Creek near TP-2. No flow in Chippewa Creek near TP-1.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? TP-2 - 5 acres

Wetlands present: Yes X, No , Describe: Minor along stream

Carbonate rocks/soils: Yes X, No , Describe: Madison limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ; 10-30 ; 30-100 X;
100-300 ; 300-1,000 ; 1,000-3,000 ; 3,000-10,000 ; 10,000 or
greater ; Comments

Nearest residence: <1,000 ft; X 1,000 ft - 0.5 miles; >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, West

[illegible]

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe: Occasional rancher at TP-2

Population within 1 mile: 1-10 X; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments Residences in Gilt Edge; ranch up Chippewa Creek.

Evidence of recreational use on site: Yes X, No____, Describe: Off-road vehicle tracks

Accessibility (check each that apply): Easy Easily accessible - no fences, gates, or warning signs; X Moderately Accessible - barbed wire fences, road gated, or signs posted; Difficult Difficult Access - chain-link fence, road gated and locked, site guarded (does not include locked or manned access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment____
Wilderness Area - Yes____, No X, Comment____
T&E Species Habitat - Yes____, No X, Comment____
Bat Habitat - Yes X, No____, Comment Possible, open adit

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium X, Low____

Fisheries Habitat and Species Classification - 5

Sport Fishery Classification - 5

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 2, types and locations:____
Adits at mine above TP-1

Hazardous structures: Yes X, No____, Number 1, types and locations:____
Vats and loadout at TP-2

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes X, No____, Number 1, types and locations: TP-2 has steep gullies and one undercut "cave".

Fire and/or Explosion hazards: Yes____, No X, Explain:____

Bibliography

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Gilt Edge, Prepared by Mark Carlstrom and Ben Mundie, November 7, 1979 and July 18, 1980.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Gilt Edge, Prepared by Westech, Date Unknown.

MDSL/AMRB Files, Montana Cultural Resource Inventory Form for Gilt Edge, Prepared by GCM Services, Inc., December 22, 1986.

MDSL/AMRB Files, Preliminary Assessment of the Abandoned Mine Impacts in the Gilt Edge Mining District, Fergus County, MT, Prepared by Robert Peccia & Associates, October 1987.

USGS, Topographic Map, Judith Peak, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

**GILT EDGE TAILINGS
PA NO. 14-008**

Gilt Edge Tailings PA# 14-008
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/14/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
14-008-SE1	1.7 JX	7.5 J	103	0.5 U	3.9	5.2	6.8	7530	0.02 UJ	619	8.9	23.2	5.4 UJ	70.6	NR
14-008-SE2	2.4 JX	147 J	221	0.7 U	9.0	9.9	16.9	15200	1.58 J	340	22.7	25.5	7.7 UJ	169	NR
14-008-SE3	1.8 JX	183 J	247	0.8 U	4.9	6.1	9.7	8900	1.59 J	309	9.0	11.2 U	33.4 J	94.8	NR
14-008-TP1	1.0 JX	389 J	325	0.5 U	3.9	3.7	11.8	10200	2.23 J	293	10.5	35.1 U	21.0 J	96.1	0.628
14-008-TP2	0.5 UX	928 J	257	0.4 U	13.9	11.9	14.8	15400	4.50 J	309	11.0	29.5 U	128 J	148	9.899
BACKGROUND	0.5 UX	131 J	124	0.5 U	7.0	13.4	14.5	17600	0.08 J	467	18.2	19.3	5.3 UJ	65.6	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL		SULFUR		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR		SULFUR	
	SULFUR %	ACID BASE U/1000t	NEUTRAL POTENT. U/1000t	POTENT. U/1000t	SULFUR %	ACID BASE U/1000t	SULFUR %	ACID BASE U/1000t	SULFUR %	ACID BASE U/1000t	SULFUR %	ACID BASE U/1000t	SULFUR %	ACID BASE U/1000t	POTENT. U/1000t	ACID BASE U/1000t
14-008-TP1	0.05	1.56	439	438	<0.01	0.03	0.06	0.94	0.06	0.03	0.03	<0.01	0.03	0.06	438	438
14-008-TP2	0.27	8.43	253	245	0.24	<0.01	0.03	0.00	0.03	0.00	<0.01	<0.01	0.03	0.03	253	253

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	Ag	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
14-008-GW1	0.12 U	2.0	33.8	2.6 U	8.7 U	4.7 U	4.6 U	766	0.08 U	163	8.0 U	2.3	29.4 U	4.5 U	471
14-008-SW2	0.12 U	98.9	141	2.6 U	8.7 U	5.1	4.6 U	383	0.08 U	194	8.0 U	2.5	29.4 U	10.2	385
14-008-SW3	0.12 U	51.5	127	2.6 U	8.7 U	4.7 U	4.6 U	189	0.10	32.6	8.0 U	1.8	29.4 U	4.5 U	419

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	Total DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
14-008-GW1	NR	NR	NR	<0.05	<0.005
14-008-SW2	423	<5	53	0.09	NR
14-008-SW3	449	<5	89	0.23	NR

LEGEND

SE1 - Upstream 400' above TP1.
 SE2 - Downstream of TP1, 1/4 mile from TP2 in Chippewa Creek.
 SE3 - Downstream of TP2 in Chippewa Creek.
 TP1 - Composite of subsamples TP1A and 1B.
 TP2 - Composite of subsamples TP2A through 2E.
 BACKGROUND - From the Pioneer John Mine (14-090-SS1).

GW1 - Reckless well 1,000' downgradient from site.
 SW2 - Same as sample 14-008-SE2.
 SW3 - Same as sample 14-008-SE3.

XRF ANALYSIS RESULTS

**GILT EDGE TAILINGS
PA NO. 14-008**

Mine Name: Gilt Edge Tailings PA# 14-008
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
14-008-SE250		7412.94	81978.2	1134.79			9482.27				117.682 *	358.765	266.914
14-008-SE500		5965.95	37963.4	418.849 *		636.925 *	10637.9				139.601 *	298.972	158.844
14-008-SL1		4800.25	2297.81	4547.05		798.849 *	120960	1167.9 *		145.662 *	140.631 *	73.4065 *	611.498
14-008-TP1A		10591	107964	785.12	412.8 *	924.254 *	13479.6				133.697 *	553.975	177.613
14-008-TP1B		14062.1	143299	1124.13		657.532 *	14636.7				162.702 *	564.473	238.069
14-008-TP1-COMP		12489.3	89462.2	629.611 *	304.358 *	509.676 *	11091.5				103.031 *	425.633	167.296
14-008-TP2A		10670.9	84221.7	1052.4		509.3 *	16389.1			79.6183 *	209.605 *	1250.66	340.25
14-008-TP2B		19766.9	90315.3	1649.68		622.001 *	17323.2				75.6914 *	1243.11	436.312
14-008-TP2C		16104.7	94438.4	1268.8		580.981 *	19606.9				177.761 *	1338.89	329.002
14-008-TP2D		17527.7	88203.5	1686.96			16445.2				134.202 *	977.19	391.601
14-008-TP2E		8226.13	67452.7	1001.2		478.245 *	14740.4				912.812	997.975	355.583
14-008-TP2F		14026.3	90910.8	1305.95		613.801 *	17801.6				351.315	1121.91	399.729
14-008-TP2-COMP		11394.9	69594.8	910.392	288.273 *		14112.5			90.6828 *	144.439 *	1062.89	347.209

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
14-008-SE250	109.776				27.354 *			82.781 *	220.005			
14-008-SE500	100.822				23.7999 *				137.65			
14-008-SL1	972.201		18.2096 *						195.165		13.9727 *	17.909 *
14-008-TP1A	87.9337							54.9138 *	295.128		26.5707 *	
14-008-TP1B	112.983			34.4407 *	51.0687 *				574.472		17.9099 *	
14-008-TP1-COMP	93.9688			35.6878 *	64.884 *				397.27			
14-008-TP2A	133.322		8.62601 *		67.6579 *			54.8652 *	261.695			
14-008-TP2B	141.022	73.6065 *	8.47766 *		41.6201 *			190.649	347.456		16.622 *	10.6472 *
14-008-TP2C	129.066				57.2299 *			207.195	245.18		16.6566 *	11.7626 *
14-008-TP2D	147.997				61.6362 *			187.662 *	223.789		15.1433 *	11.3763 *
14-008-TP2E	152.755				60.0112 *			142.902 *	377.192			
14-008-TP2F	149.8	66.6176 *	10.7196 *	279.978	25.8969 *			147.119 *	365.051			
14-008-TP2-COMP	125.326			47.6055 *	62.3466 *			190.96 *	213.502		14.6805 *	

* = Estimated Quantity

\$ = Unvalidated Data

**SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES**

LABORATORY REPORT

To: Robert Peccia and Associates (1)
Address: 810 Hialeah Court
P.O. Box 4518
Helena, Montana 59601
ATTN: Brian J. Harrison

Lab No.: 87-10289
Date: 9-01-87 pjf

SPECIAL ANALYSIS

GE-1
Submitted 8-18-87

RECEIVED

SEP 1 1987

**ROBERT PECCIA
& ASSOCIATES****1. TCLP Extraction and Analysis.**

Sample appearance: Brown Soil

Extraction and analysis performed according
to 40 CFR, Part 260 et al., App. 1 (Toxicity
Characteristic Leaching Procedure).

<u>CONSTITUENT</u>	<u>mg/l in Extract</u>
Arsenic -----	<0.5
Cadmium -----	<0.1
Copper -----	0.3
Gold -----	<0.1
Lead -----	<0.5
Manganese -----	3.6
Mercury -----	<0.02
Selenium -----	0.1
Silver -----	<0.5
Zinc -----	0.3

2. Total Cyanide ----- 3.2 ug/g

LABORATORY REPORT

To: Robert Peccia and Associates (1)
Address: 810 Hialeah Court
P.O. Box 4518
Helena, Montana 59601
ATTN: Brian J. Harrison

Lab No.: 87-10290
Date: 9-01-87 pjf

SPECIAL ANALYSIS

GE-2
Submitted 8-18-87

1. TCLP Extraction and Analysis.

Sample appearance: Brown Soil

Extraction and analysis performed according
to 40 CFR, Part 260 et al., App. 1 (Toxicity
Characteristic Leaching Procedure).

<u>CONSTITUENT</u>	<u>mg/l in Extract</u>
Arsenic -----	<0.5
Cadmium -----	<0.1
Copper -----	0.1
Gold -----	<0.1
Lead -----	<0.5
Manganese -----	3.0
Mercury -----	<0.2
Selenium -----	<0.1
Silver -----	<0.5
Zinc -----	0.2

2. Total Cyanide ----- 0.6 ug/g

LABORATORY REPORT

To: Robert Peccia and Associates (1)
Address: 810 Hialeah Court
P.O. Box 4518
Helena, Montana 59601
ATTN: Brian J. Harrison

Lab No.: 87-10291
Date: 9-01-87 pjf

SPECIAL ANALYSIS

GE-3
Submitted 8-18-87

1. **TCLP Extraction and Analysis.**

Sample appearance: Brown Soil

Extraction and analysis performed according to 40 CFR, Part 260 et al., App. 1 (Toxicity Characteristic Leaching Procedure).

<u>CONSTITUENT</u>	<u>mg/l in Extract</u>
Arsenic -----	<0.5
Cadmium -----	<0.1
Copper -----	0.2
Gold -----	<0.1
Lead -----	<0.5
Manganese -----	<0.1
Mercury -----	<0.02
Selenium -----	<0.1
Silver -----	<0.5
Zinc -----	<0.1

2. Total Cyanide ----- <0.5 ug/g

LABORATORY REPORT

To: Robert Peccia and Associates
Address: 810 Hialeah Court
P.O. Box 4518
Helena, Montana 59601
ATTN: Brian J. Harrison

(1)

Lab No.: 87-10292
Date: 9-01-87 pjf

SPECIAL ANALYSIS

GE-4
Submitted 8-18-87

1. TCLP Extraction and Analysis.

Sample appearance: Brown Soil

Extraction and analysis performed according
to 40 CFR, Part 260 et al., App. 1 (Toxicity
Characteristic Leaching Procedure).

<u>CONSTITUENT</u>	<u>mg/l in Extract</u>
Arsenic -----	<0.5
Cadmium -----	<0.1
Copper -----	<0.1
Gold -----	<0.1
Lead -----	<0.5
Manganese -----	3.2
Mercury -----	<0.02
Selenium -----	<0.1
Silver -----	<0.5
Zinc -----	1.3

2. Total Cyanide ----- 0.5 ug/g

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**GILT EDGE TAILINGS
PA NO. 14-008**

AIMSS SCORESHEET

SITE NAME:

Gilt Edge Tailings

PA NUMBER:

14-008

LINE NO.				
<u>GROUNDWATER PATHWAY</u>				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	25.457
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		0
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	7.5
10		GROUNDWATER SCORE	LINES 4 x 5 x 9	76371
<u>SURFACE WATER PATHWAY</u>				
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	25.658
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		SURFACE WATER SCORE	LINES 14 x 15 x 23	323291
<u>AIR PATHWAY</u>				
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		5
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.124
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34	2529
<u>DIRECT CONTACT PATHWAY</u>				
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.117
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	8
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43	1340
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE (LINES 10 + 24 + 35 + 44) / 100,000			4.04

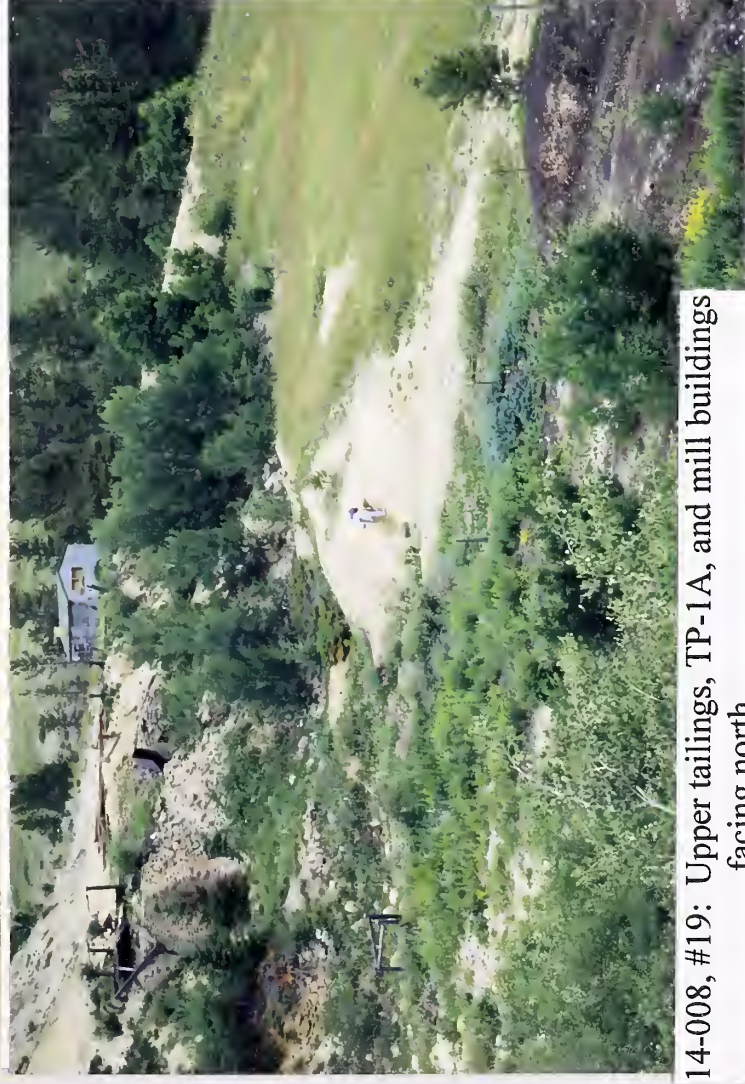
LINE NO.	SITE SAFETY			Gilt Edge Tailings 14-008
	THREAT	ACCESSIBILITY		
1				10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		100
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	240
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	8
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	19.20



14-008, #17: Upper tailings facing south



14-008, #18: Middle of upper tailings and slag



14-008, #19: Upper tailings, TP-1A, and mill buildings facing north



14-008, #20: Adit #2 (closed) along road



14-008, #21: Cyanide building full of core samples



14-008, #22: Impoundment and upstream Ox Frame Gulch toward SE-1 sample location



14-008, #23: Adit #1 (HMO) in Ox Frame Gulch



14-008, #24: TP-1B sample location



14-008, #25: Erosion gully in reclaimed tailings



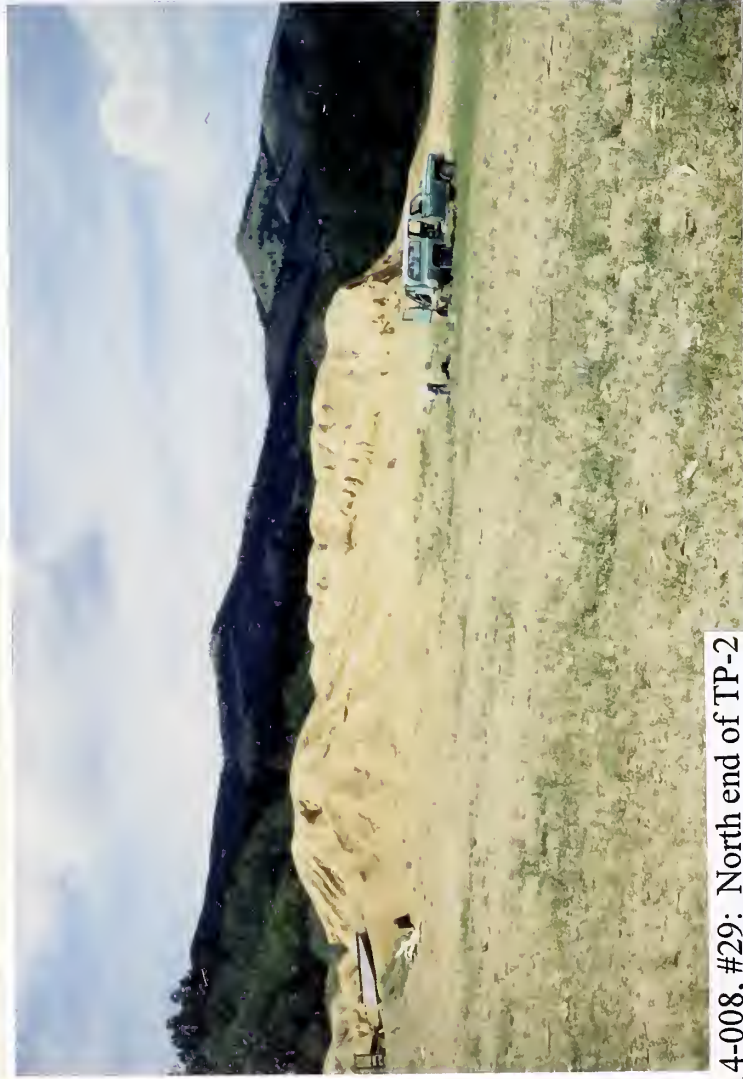
14-008, #26: SW-3 sample location



14-008, #27: SW-2 sample location



14-008, #28: South half of site with mill and south end of TP-2 from east



14-008, #29: North end of TP-2



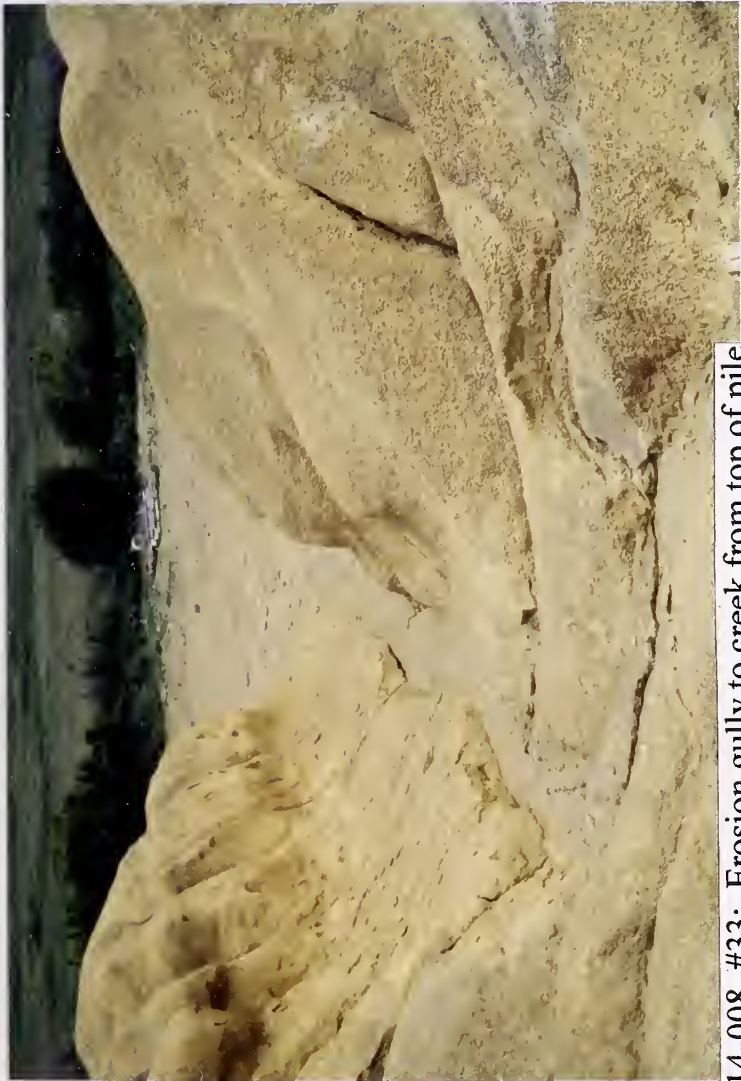
14-008, #30: TP-2 showing erosion gully



14-008, #31: Tailings entering creek (north of TP-2)



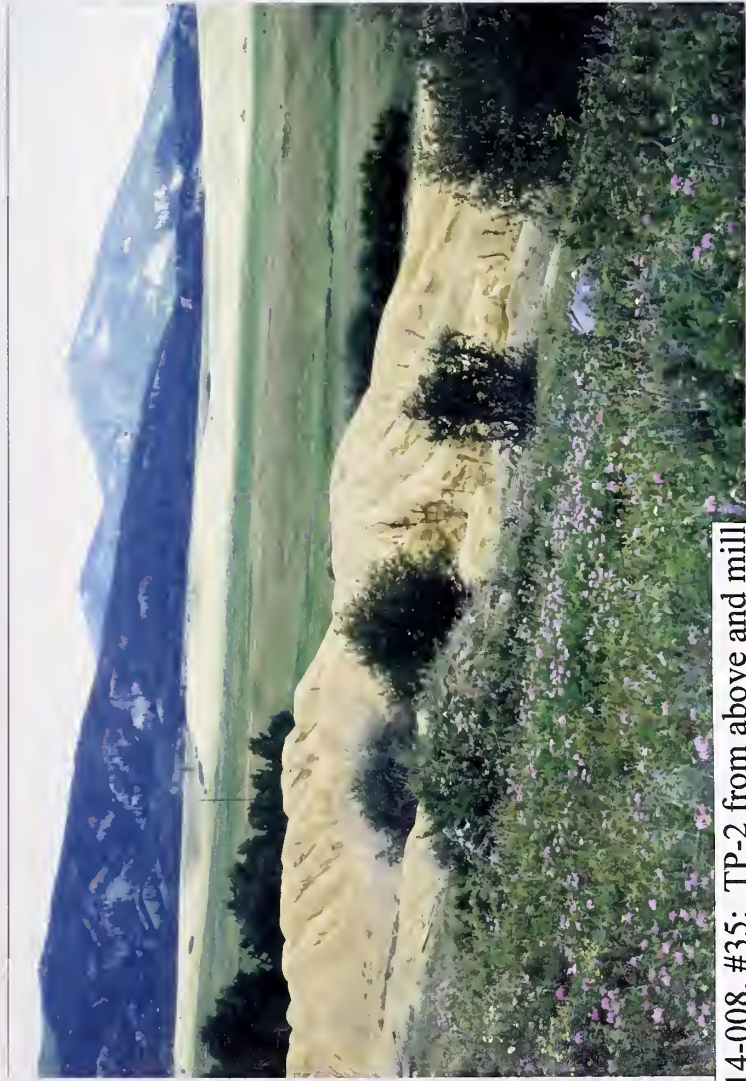
14-008, #32: West end of TP-2 and small adjacent piles



14-008, #33: Erosion gully to creek from top of pile



14-008, #34: Empty cyanide vats in mill area



14-008, #35: TP-2 from above and mill



14-008, #36: Outwash area to the east of the site

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: WESTERN MINE AND MILLSITE PA#: 14-023/14-030

Date: July 13, 1994 Time: 0900-1630

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Bisch, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Warm; sunny; partly cloudy in the afternoon.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #5: HMO at Shaft #3 and two other caved shafts; #6: WR-4, vegetated dump; #7: WR-5A from road; #8: WR-5B from road; #9: Remains of south mill and loadout (no tailings); #10: Adit #4 (HMO); #11: WR-6 from below; #12: WR-7 facing west; #13: Adit #5 (HMO) at WR-7; #14: Adit #6 (HMO) above road in northwest complex; #15: Adit #7 (HMO) above mill remains; #16: Possible mill remains. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Few HMOs remain. Dumps are revegetating naturally; dumps are small and scattered. No tailings were found.

Other Hazardous Materials/Substances Present: None, but many empty barrels present at northwest millsite.

General Comments on Potential Remedial Alternatives: Recontour and revegetate dumps; fill remaining HMOs. Remove mill structure.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): WESTERN MINE AND MILLSITE PA#: 14-023/14-030

Legal Description:

MINE T 16N ; R 19E ; Sec. 11 , NE 1/4 NW 1/4 1/4

MILLSITE T 16N ; R 19E ; Sec. 11 , NW 1/4 NW 1/4 1/4

County: FERGUS Mining District: WARM SPRINGS

MINE Latitude: N 47° 10' 11" Longitude: W 109° 17' 15"

MILLSITE Latitude: N 47° 10' 07" Longitude: W 109° 16' 37"

Primary Drainage Basin and Code: Warm Spring Creek/10040103

Secondary Drainage Basin: Devils Canyon/Muskrat Creek

USGS Quadrangle map name(s): New Year

Mine Type/Commodities: Hardrock, Millsite/Gold

Activity Status: Active ☐ , Inactive/Exploration ☐ , Abandoned ☒ .

Ownership: Known Y ☐ N ☒ ; private/public? Private

Owner, Agent, or Contact (Include address and phone when available): Unknown

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits?

Past Reclamation Activities? Several adits closed by MDSL.

General site features: Elevation 4800' , Slope 5°-20° ,

Aspect West

Land use: Mining ☐ , Recreational ☒ , Residential ☒ , Urban ☐ ,

Agricultural ☒ , Other (Specify)

Area of disturbed/unvegetated lands? 3 acre(s) .

Site Dimensions: Small disturbances over an area of 1/2 mile x 1/2 mile.

Predominant vegetation types: Ponderosa pine, Douglas fir, Quaking aspen; recent forest fire in vicinity of site.

Access: roads - good (paved) ☐ , poor (maintained dirt road) ☐ , 4wd ☒ , trail ☐ .

Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius according to MBMG Well Log Database; however, a ranch located 1 mile west of the mill may have a well.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Devils Canyon flows past site to confluence with Muskrat Creek 1 mile away. Muskrat Creek flows to confluence with Warm Spring Creek 4 miles away. Site is underlain by limestone.

Mining/milling history, ore type/tenor, host rock, gangue: Quartz/calcite veins in limestone host

Mine Operation?

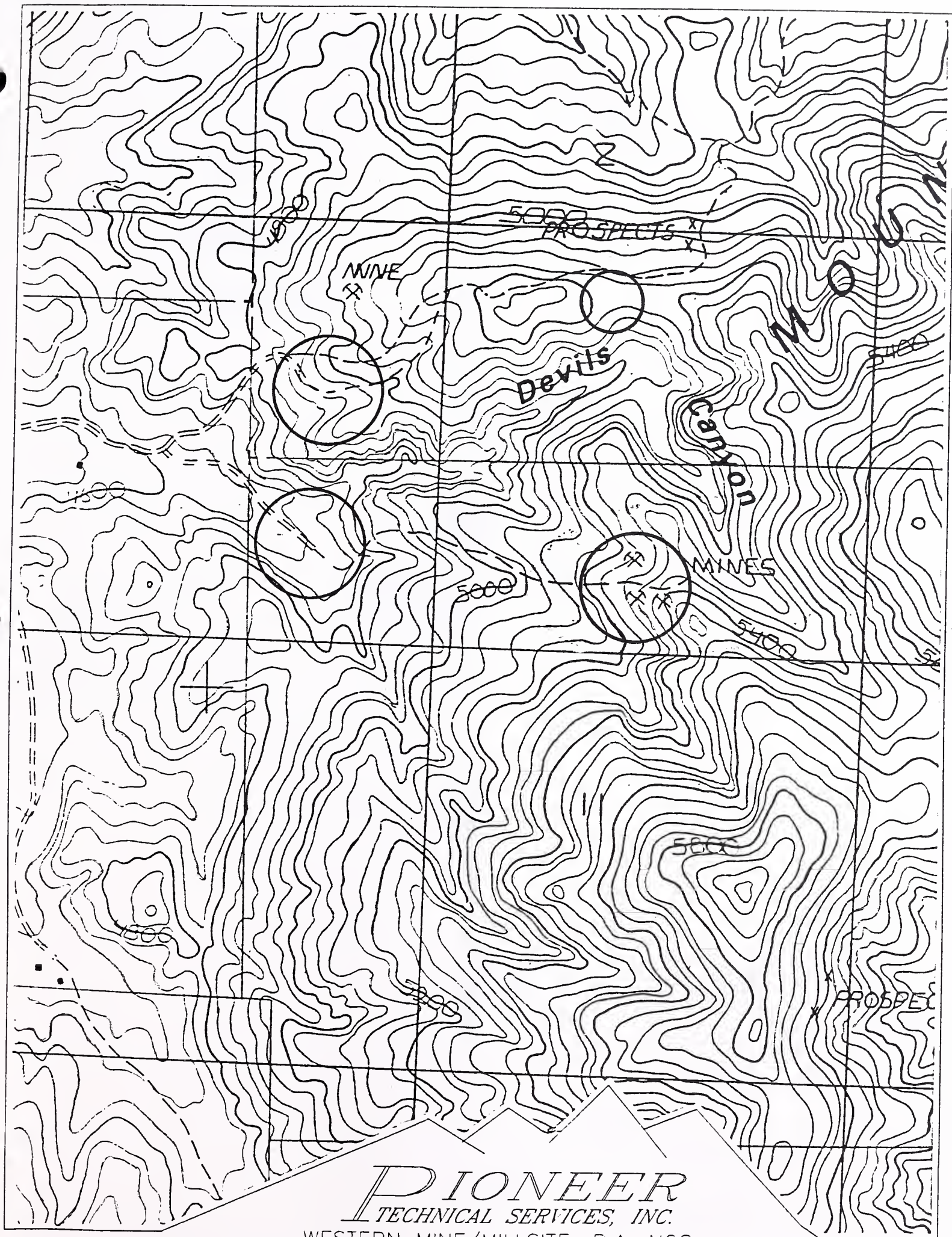
Shafts - Yes X, No , # 4, Comment All caved
Adits - Yes X, No , # 15, Comment 4 HMOs; 3 culvert gated
Pits - Yes , No X, # , Comment
Placers - Yes , No X, # , Comment
Other - Yes , No X, # , Comment

Mill Operation? Yes X, No . If yes answer the next three questions:

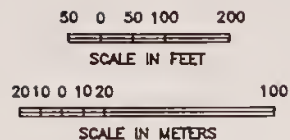
Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Unknown; no evidence of milling process (no tailings on-site).



PIONEER
TECHNICAL SERVICES, INC.
WESTERN MINE/MILLSITE, P.A. NOS.
14-023 & 14-030
T16N, P19E, SECTION 11
SCALE: 1" = 1000'



DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

WESTERN MINE AND MILL
PA#14-023

DRAWING NO.: PT340224

DATE: 11/8/94

REV: --

PLOT SCALE: 1" = 80'

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Bisch

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1	WR	10	Southeast area; west dump	None	6.7 (D)	0.02	14-023-WR-1	07/13/94 1550	T-Metals, ABA
WR-2	WR	10	Southeast area; east of WR-1	None	6.8 (D)	0.02			
WR-3	WR	170	Southeast area; north of WR-1 and -2 in drainage	None	6.4 (D)	0.02			
WR-4	WR	110	Southeast area; associated with Shaft #3	None	6.0 (D)	0.02			
WR-5A	WR	400	Southwest area; near mill, north of road	None	6.4 (D)	0.02	14-023-WR-2	07/13/94 1555	T-Metals, ABA
WR-5B	WR		Southwest area; near mill, south of road	None	6.2 (D)	0.03			
WR-6	WR	80	Northeast area; Portal #2	None	6.8 (D)	0.02	N/A	N/A	XRE Analysis
WR-7A	WR	250	Northwest area; north side of large dump	None	6.2 (D)	0.02	14-023-WR-3	07/13/94 1600	T-Metals, ABA
WR-7B	WR		Northwest area; south side of large dump	None	5.8 (D)	0.04			
MILL	OTH		Waste rock pile by northwest mill; possible tailings	None	5.4 (D)	0.03	N/A	N/A	XRE Analysis

D-Direct reading (Galvay Meter); S-Saturated Pints (Orion Meter)

Comments or deviations from SOPs: 14-023-WR-1 is composite of WR-1 through WR-4. 14-023-WR-2 is composite of WR-5A and -5B. 14-023-WR-3 is composite of WR-7A and -7B. See Prestor John (14-090) for background soil sample.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:___ Identification:___

Filled shafts: Yes___, No X, Number:___ Identification:___

Seeps/Springs: Yes___, No X, Number:___ Identification:___

Groundwater wells within 4 miles?: Yes___, No X;

Number of well logs: 0

Distance to nearest well used for drinking:

___<1,000 ft; ___1,000 ft to 0.5 miles; X>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite___, Probable___, Possible___, Unlikely X.

High pH; carbonates; deep groundwater; low metals

Approximate Depth to Groundwater: ___<25 ft; X 25 - 100 ft; ___>100 ft.

Other observations/notes: Ranch located one mile west at "New Year" may
have a spring or well for water.

SAMPLERS:

[illegible]

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes X, No____, Name(s): Unnamed tributaries of Devils Canyon (also dry)

Other surface water: Yes____, No X, Name(s)/Description: _____

Waste materials within any floodplain: Yes____, No X Source ID(s): _____

Approximate Flood frequency? ____1 yr, ____10 yr, ____100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? N/A

High Flow: _____, Average Flow: _____

Distance between waste source(s) and nearest surface water body (ft)? 20 feet between WR-5 and unnamed tributary

Surface water draining onto or through waste sources: Yes____, No X, Describe: _____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) N/A

Observed erosional/sedimentation/stream turbidity problems? Yes____, No X. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000____.

Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): _____

SAMPLERS:

[illegible]

4 (M) pozostaw 20 (Z) pozostaw : 2012

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 3 acres near southwest mill

Wetlands present: Yes X, No , Describe: In southern tributary

Carbonate rocks/soils: Yes X, No , Describe: Abundant limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ; 10-30 ; 30-100 X;
100-300 ; 300-1,000 ; 1,000-3,000 ; 3,000-10,000 ; 10,000 or
greater ; Comments

Nearest residence: <1,000 ft; 1,000 ft - 0.5 miles; X >0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Bisch

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (TAS/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	ND	30%	No	Low
WR-2	None	Dry	ND	30%	No	Low
WR-3	None	Dry	1,500	600	Yes	Low
WR-4	FE0X	Dry	1,000	300	No	Low
WR-5	FE0X	Dry	2,200	1,100	Yes	Low
WR-6	None	Dry	1,200	360	No	Low
WR-7	FE0X	Dry	3,000	2,100	Yes	Low

Notes and Clarifications: ND = Not Determined

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe: Some logging (salvage) in the area

Population within 1 mile: 1-10____; 10-30 X; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments_____

Evidence of recreational use on site: Yes X, No____, Describe: Litter;
campfire rings

Accessibility (check each that apply): _____ Easily accessible - no fences,
gates, or warning signs; X Moderately Accessible - barbed wire fences,
road gated, or signs posted; _____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____

Wilderness Area - Yes____, No X, Comment_____

T&E Species Habitat - Yes X, No____, Comment Peregrine Falcon

Bat Habitat - Yes X, No____, Comment Possibly, open adits

Primary Drainage X; Secondary Drainage____; No Information____:

Riparian Habitat Quality - High____, Medium X, Low____

Wetlands Frontage - High____, Medium X, Low____

Fisheries Habitat and Species Classification - 3

Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 4, types and locations:____
Adits without culvert closures

Hazardous structures: Yes X, No____, Number 1, types and locations:____
Loadout at southwest mill

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes____, No X,
Number____, types and locations:_____

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Lands National Inventory, Phase II Problem Area Data Sheet for Western Mines, Prepared by Western Technology and Engineering, December 12, 1983.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Western Mine #1, Prepared by Chen-Northern, July 11, 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Western Mines Shaft, Prepared by Daphne Digrindakis, July 28, 1986.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Western Mines, Prepared by Culwell and Larsen, July 9, 1983.

USGS, Topographic Map, New Year, Montana, 7 1/2 minute Quadrangle, 1985.

LABORATORY ANALYTICAL DATA

**WESTERN MINE/MILLSITE
PA NO. 14-023 & 14-030**

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
14-023-WR1	107 JX	44.1 J	19.0	0.5 U	1.8 U	7.3	19.3	3270	2.12 J	175	5.2	36.7 U	67.4 J	75.4	NR
14-023-WR2	3.6 JX	130 J	113	0.5 U	7.7	12.3	19.9	9340	1.76 J	224	19.5	40.8	5.8	48.8	NR
14-023-WR3	124 JX	148 J	92.1	0.5 U	8.6	20.8	29.8	16400	1.16 J	219	26.9	17.4	78.2 J	46.4	NR
BACKGROUND	0.5 UX	131 J	124	0.5 U	7.0	13.4	14.5	17600	0.08 J	467	18.2	19.3	5.3 UJ	65.6	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL		SULFUR		SULFUR		SULFATE		PYRITIC		ORGANIC		PYRITIC		SULFUR	
	SULFUR	ACID BASE	NEUTRAL.	ACID BASE	POTENT.	ACID BASE	POTENT.	SULFUR	ACID BASE	POTENT.	SULFUR	ACID BASE	SULFUR	ACID BASE	POTENT.	ACID BASE
	%	1/1000t	1/1000t	1/1000t	1/1000t	%	1/1000t	%	1/1000t	1/1000t	%	1/1000t	%	1/1000t	1/1000t	1/1000t
14-023-WR1	<0.01	0.00	772	772	772	<0.01	0.04	0.05	1.25	771	0.01	1.25	0.01	1.25	540	405
14-023-WR2	0.03	0.94	541	540	540	<0.01	0.04	0.01	1.25	540	0.01	1.25	0.01	1.25	540	405
14-023-WR3	0.02	0.62	406	405	405	<0.01	0.02	0.01	0.62	405	0.01	0.62	0.01	0.62	405	405

LEGEND

WR1 - Composite of sub-samples WR1, 2, 3, and 4.
WR2 - Composite of sub-samples WR5A and 5B.
WR3 - Composite of sub-samples WR7A and 7B.
BACKGROUND - From the Pioneer John Mine (14-090-SS1).

XRF ANALYSIS RESULTS

**WESTERN MINE/MILLSITE
PA NO. 14-023 & 14-030**

Mine Name: Western Mine
 XRF Field Analyses
 Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
14-023-MILL		34487	121994	2280.17			14195.9				206.535 *	295.433	413.873
14-023-WR1		6819.55	182870		239.536 *	680.495 *	6041.34				116.97 *	91.3706 *	209.39
14-023-WR1-COMP		3069.35	209737		288.414 *	676.118 *	2523.36				120.024 *	58.3298 *	122.037
14-023-WR2	2186.92	196724			318.879 *	460.676 *	1264.36			96.5704 *	67.4012 *		148.933
14-023-WR2-COMP		13249.5	133370	768.67	231.939 *		9169.22				97.9979 *	133.346 *	354.55
14-023-WR3		2138.58 *	200370	218.61 *	302.747 *	489.014 *	1461.03				142.38 *		86.5598
14-023-WR3-COMP		29377	66620.7	981.153		665.791 *	12454.9				62.9683 *	161.724 *	308.166
14-023-WR4		10294.4	40221.7			768.084 *	27213.7		103.898 *		163.916 *	430.776	110.92
14-023-WR5A		12943.9	151789	1130.03	375.657 *		8390.02				85.9174 *	120.963 *	336.406
14-023-WR5B		22549.1	121908	1082.83 *		556.107 *	15096				63.9433 *	141.855 *	292.133
14-023-WR6	779.759 *	7365.06	159913	603.196 *	270.712 *	738.916 *	7250.66			97.1275 *		48.2554 *	96.4767
14-023-WR7A		40792.1	89546.2	844.779 *			13028.2					177.135 *	481.672
14-023-WR7B		27613.7	84981.6	1394.2			16896.9			84.2688 *	99.9062 *	146.534 *	329.468

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
14-023-MILL	137.96											
14-023-WR1	46.2922				105.32				85.1925 *	240.348 *	17.4527 *	
14-023-WR1-COMP	9.49824 *										12.8857 *	
14-023-WR2	13.6749										12.6685 *	
14-023-WR2-COMP	83.4497		7.76031 *		46.4611 *				94.5643 *			9.65141 *
14-023-WR3	118.923											
14-023-WR3-COMP	70.672											
14-023-WR4	71.6333			50.5261 *	82.8126			73.7282 *	125.61		18.9135 *	13.4843 *
14-023-WR5A	84.564				38.4714 *			218.027	54.1739 *	770.817	15.5391 *	10.4247 *
14-023-WR5B	41.6341		8.80014 *	38.2774 *	45.4546 *				129.57			
14-023-WR6	80.9923				44.9037 *							
14-023-WR7A	217.826		10.0806 *		134.125			109.078 *	125.685 *		10.4491 *	
14-023-WR7B					84.0729			58.9794 *	213.535		17.9736 *	10.6936 *

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**WESTERN MINE/MILLSITE
PA NO. 14-023**

AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Western Mine/Mill
14-023

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6			0.042
7	GW - TARGETS	WELLS - 1 MI. x 2.5	0.0
8		WELLS - 1 TO 4 MI	0
9		NEAREST WELL	0
10		TARGETS SCORE	LINES 6 + 7 + 8
		GROUNDWATER SCORE	LINES 4 x 5 x 9
			0
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	0
12		EXCEEDENCES	0
13A	SW - LIKELIHOOD	CONTAINMENT	20
13B	OF RELEASE	DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16			0.090
17		DRINKING WATER POP'N	0
18		IMPACTED DRAINAGE	0
19	SW - TARGETS	WETLANDS	0
20		FISHERY	5
21		RECREATION	0
22		IRRIGATION/STOCK	0
23		T & E SPECIES HABITAT	5
24		TARGETS SCORE	SUM LINES 16 THRU 22
		SURFACE WATER SCORE	LINES 14 x 15 x 23
			360
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29			0.003
30		POPULATION - 4 MILES	30
31	AIR - TARGETS	NEAREST RESIDENCE	0
32		WETLANDS	10
33		PARKS / WILDERNESS	0
34		T & E SPECIES HABITAT	5
35		TARGETS SCORE	SUM LINES 29 THRU 33
		AIR PATHWAY SCORE	LINES 27 x 28 x 34
			3
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF	ACCESSIBILITY	10
37B	EXPOSURE	DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40			0.001
41	DIRECT CONTACT	POPULATION - 1 MILE	10
42	TARGETS	NEAREST RESIDENCE	0
43		RECREATIONAL USE	5
44		TARGETS SCORE	SUM LINES 40 THRU 42
		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
			2
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		0.00

LINE
NO.

SITE NAME:

Western Mine/Mill

PA NUMBER:

14-023

SITE SAFETY

1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	200
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	240
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	15
13		SITE SAFETY SCORE	(LINES 1 x 8 x 12) / 1,000	36.00



14-023, #5: Shaft #3 (HMO)



14-023, #6: WR-4 (vegetated)



14-023, #7: WR-5A from road



14-023, #8: WR-5B from road



14-023, #9: Remains of south mill and loadout



14-023, #11: WR-6 from below



14-023, #10: Adit #4 (HMO)



14-023, #12: WR-7 facing west



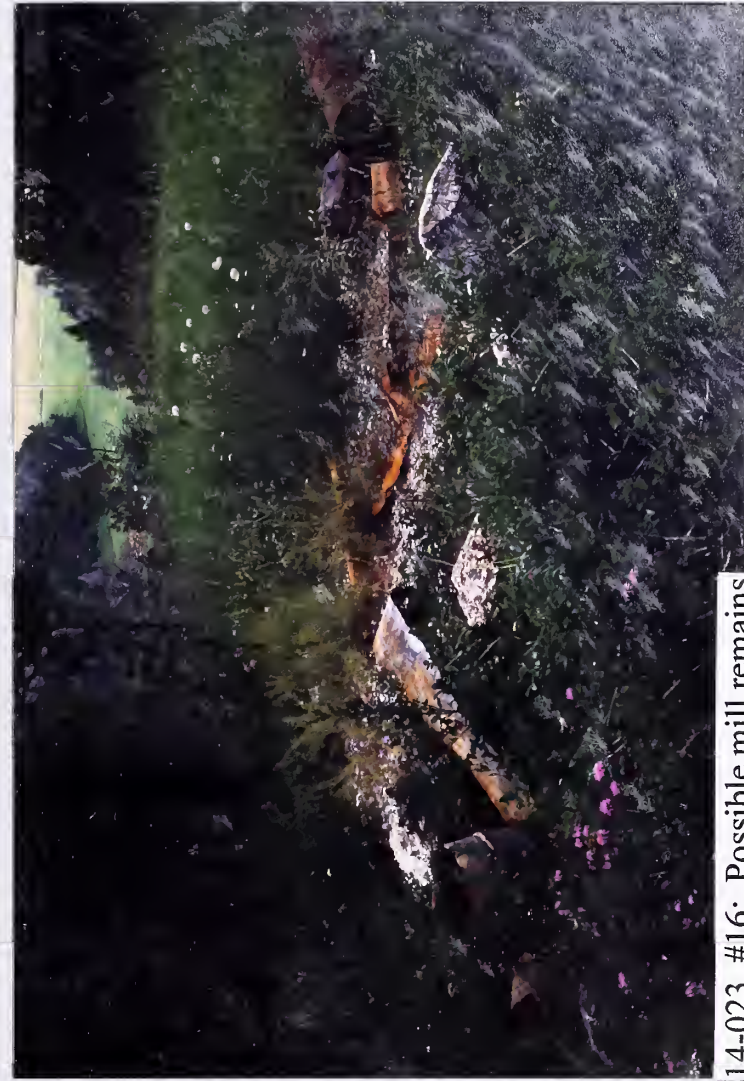
14-023, #13: Adit #5 (HMO) at WR-7



14-023, #14: Adit #6 (HMO) above road in northwest complex



14-023, #15: Adit #7 (HMO) above mill



14-023, #16: Possible mill remains

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: PRESTER JOHN PA#: 14-090

Date: July 15, 1994 Time: 0900-1330

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Bisch, West; Pioneer

Visitors: None

Weather/Seasonality Observations: Mostly cloudy; warm; dry.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #3: View of top of drainage tailings from millsite; #4: WR-3 from below; #5: Slag pile viewed from drainage; #6: Adits with broken gates; #7: WR-2 from side; #8-#10: TP-1 near top of drainage; #11-#13: TP-1 near central part of drainage; #14: TP-1 near dam; #15: End of tailings pile showing tailings in stream bottom; #16: Tailings in wash below central part of drainage; #17: SE-2 sample location.
Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Large volume of tailings in drainage - no impoundment. Tailings have washed at least 1/2 mile down drainage (dry during investigation) to road below.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove tailings from drainage and dispose of in a repository. Backfill pit with waste rock and revegetate.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): PRESTER JOHN PA#: 14-090

Legal Description: T 16N ; R 20E ; Sec. 30 , S 1/2 SW 1/4 1/4

County: FERGUS Mining District: WARM SPRINGS

Latitude: N 47° 07' 4.6" Longitude: W 109° 14' 30.5"

Primary Drainage Basin and Code: Chippewa Creek/10040204

Secondary Drainage Basin: South Fork Chippewa Creek

USGS Quadrangle map name(s): Judith Peak/Horsethief Coulee West

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active , Inactive/Exploration X , Abandoned X .

Ownership: Known Y N X ; private/public? Private/Public
Owner, Agent, or Contact (Include address and phone when available): Unknown; BLM

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 5200' , Slope 5°-15° ,
Aspect Southeastern

Land use: Mining , Recreational X , Residential , Urban ,
Agricultural , Other (Specify)

Area of disturbed/unvegetated lands? 5 acre(s) .
Site Dimensions: 500 feet x 500 feet (mines); 0.5 mile of tailings
in drainage.

Predominant vegetation types: Ponderosa pine, Douglas fir, aspen
in drainage, juniper

Access: roads - good (paved) , poor (maintained dirt road) ,
4wd X , trail .

Other logistical considerations (proximity to other sites).
Southwest of Gilt Edge mine approximately 2 miles.

Well logs within 1 mile radius; (Attach MBMG Well Log Printout(s): There are no wells reported within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in an unnamed tributary of South Fork Chippewa Creek. Water leaving the site would flow southeast to confluence with South Fork 1 mile away. South Fork meets main Chippewa Creek 3.25 miles northeast of that confluence.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

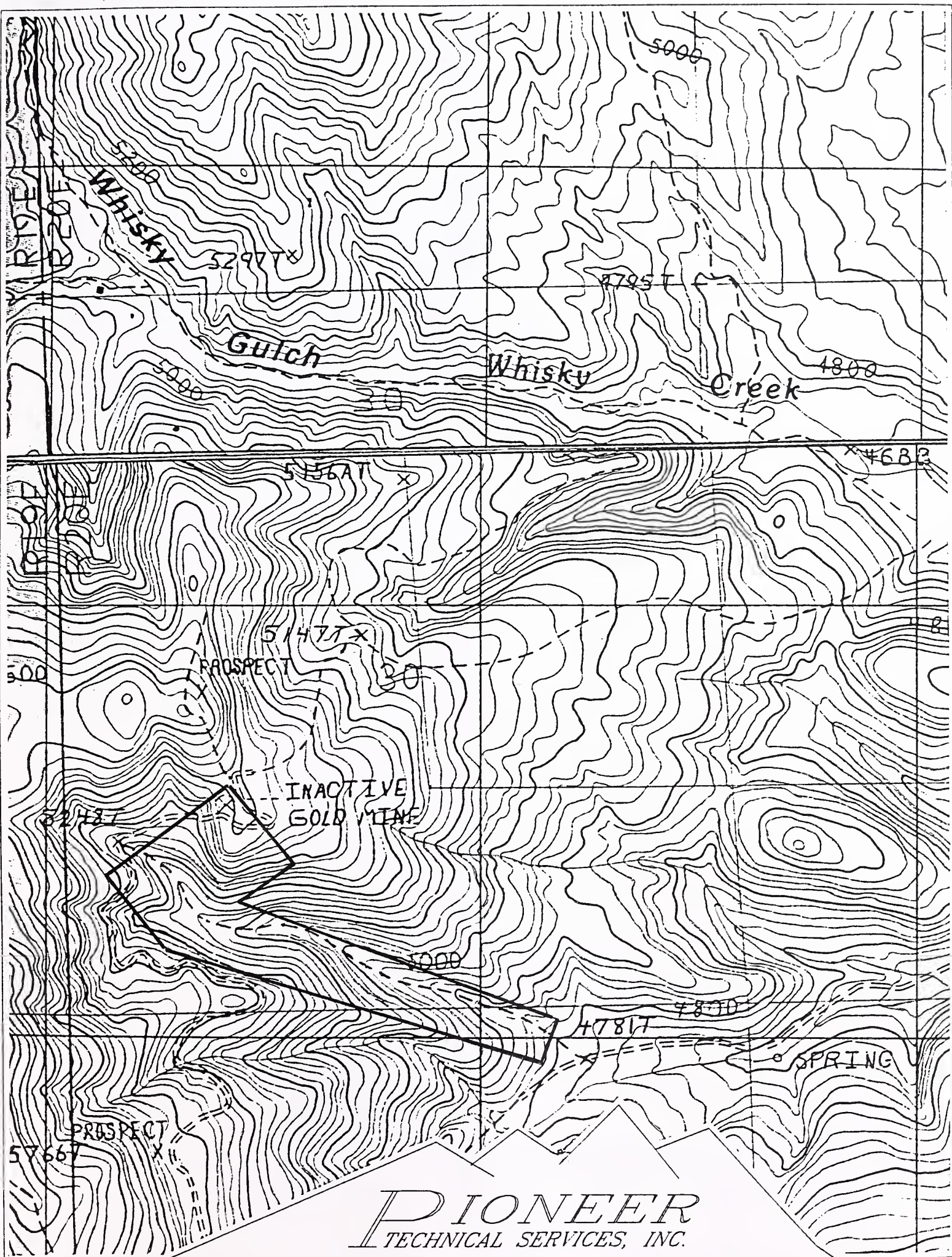
Shafts - Yes X, No , # 1, Comment Fenced
Adits - Yes X, No , # 3, Comment 1 collapsed; 2 open with broken gates
Pits - Yes X, No , # 1, Comment
Placers - Yes , No X, # , Comment
Other - Yes X, No , # 3, Comment 2 stopes; 1 caved-in area; trench

Mill Operation? Yes X, No . If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill Dedicated Mill ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Unknown; possibly gravity separation.



PRESTER JOHN, P.A. NO. 14-090
T16N, P20E, SECTION 30
SCALE: 1" = 1000'

WR1
AREA= 380 SQ.M.
4070 SQ.FT.
450 SQ.YDS.
VOLUME= 452 CU.YDS.

MINOR WORKINGS
X X
X X
X X
MINOR WORKINGS

WR2
AREA= 740 SQ.M.
8000 SQ.FT.
890 SQ.YDS.
VOLUME= 1481 CU.YDS.

OPEN PIT

FENCED SHAFT
ADITS 1&2

WR3
AREA= 810 SQ.M.
8715 SQ.FT.
970 SQ.YDS.
VOLUME= 1935 CU.YDS.

SL1
AREA= 280 SQ.M.
3010 SQ.FT.
335 SQ.YDS.
VOLUME= 335 CU.YDS.

SLAG PILE
SL-1

COLLAPSED CABIN

TP1
AREA= 13070 SQ.M.
140830 SQ.FT.
15625 SQ.YDS.
VOLUME= 20,834 CU.YDS.

50 0 50 100 200
SCALE IN FEET

20 0 20 50 100
SCALE IN METERS

LEGEND

- | | |
|--|------------------------------------|
| ⊗ XRF SAMPLE | ===== IMPROVED ROAD |
| ⊗ ^w WATER SAMPLE GROUND AND SURFACE | ----- UNIMPROVED ROAD |
| Y OPEN ADIT | ==== CULVERT |
| ✕ COLLAPSED ADIT | ▨ STRUCTURE |
| ⊠ OPEN SHAFT | ⬮ EXCAVATION |
| ⬮ COLLAPSED SHAFT | ▲ SLOPE DIRECTION |
| → DRAINAGE | ⬮ WASTE ROCK DUMP OR TAILINGS PILE |
| → DRY DRAINAGE | |
| ✕ ✕ ✕ FENCE | |

POSSIBLE DAM LOCATION

WASHOUT TAILINGS
PERSIST BELOW DAM

SE-2

SE 500

DRAWN FOR:

PIONEER
TECHNICAL SERVICES, INC.

TITLE:

PRESTER JOHN
PA# 14-090

DRAWING NO.: PT340234
DATE: 10/24/94

REV: -
PLOT SCALE: 1 = 80

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification: (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures/vessels sound, are runoff/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): At former dam, tailings are very fine, silt and clay (TP-1A); above, tailings are silts mixed with 1/4" gravels.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Average depth is 3 feet. Clays and fines lower down drainage near dam; coarser material above, closer to mill due to gravity separation.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Old dam was breached long ago.

Comments on potential for mitigation: Some vegetation is naturally pioneering.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, West

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd ³)	LOCATION/DESCRIPTION	CONTAINMENT	PH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/TIME	ANALYSES
WR-1	WR	450	Dump from shaft uphill (north)	None	6.6 (D)	0.03	14-090-WR-1	07/15/94 2000	T-Metals, ABA
WR-2	WR	1,480	Dump from adit above road	None	6.7 (D)	0.03			
WR-3A	WR	1,935	Dump from adit below road; east half	None	5.9 (D)	0.03			
WR-3B	WR		Dump from adit below road; west half	None	6.2 (D)	0.02			
SL-1	OTH	335	Slag pile in drainage	None	6.0 (D)	0.02	N/A	N/A	XRF Analysis
TP-1A	TAIL	20,835	Fine tailings at dam downstream; 0-4'	None	6.4 (D)	0.03	14-090-TP-1	07/15/94 2030	T-Metals, ABA, Cyanide
TP-1B	TAIL		Coarse tailings above dam 500'; 0-5'	None	6.7 (D)	0.04			
TP-1C	TAIL		Coarse tailings above dam 1,000'; 0-4.5'	None	6.7 (D)	0.04			
TP-1D	TAIL		Coarse tailings below mill 100'; 0-4'	None	6.6 (D)	0.02			
SS-1	SOIL	N/A	Background soil on ridge 3/4 mile southwest of site, near where road branches	N/A	N/A	N/A	14-090-SS-1	07/15/94 1340	T-Metals

*Direct reading (Kalway Meter) / B-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 14-090-WR-1 is composite of WR-1, -2, -3A, and -3B. 14-090-TP-1 is composite of TP-1A through -1D.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes____, No X, Number:____ Identification:_____

Filled shafts: Yes____, No X, Number:____ Identification:_____

Seeps/Springs: Yes____, No X, Number:____ Identification:_____

Groundwater wells within 4 miles?: Yes____, No X;

Number of well logs: 0

Distance to nearest well used for drinking:

____<1,000 ft; ____1,000 ft to 0.5 miles; X>0.5 miles.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW);
Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter),
temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?

Definite____, Probable____, Possible X, Unlikely____.

Uncontained tailings in drainage with shallow groundwater.

Approximate Depth to Groundwater: X<25 ft; ____ 25 - 100 ft; ____ >100 ft.

Other observations/notes: N/A

SAMPLERS:

[illegible]

Notes: Estimated (E) or Measured (M) from add, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X, Name(s): _____

Dry streambeds: Yes X, No____, Name(s): Unnamed tributary of South Fork Chippewa Creek

Other surface water: Yes____, No X, Name(s)/Description: _____

Waste materials within any floodplain: Yes X, No____ Source ID(s): TP-1 and WR-3 are in intermittent drainages.

Approximate Flood frequency? X 1 yr, ____ 10 yr, ____ 100 yr

Estimated seasonal flow of stream(s) (cfs/gpm)? 0

High Flow: 1 cfs, Average Flow: Dry

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No____, Describe: Water course through gullies in TP-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Chippewa Creek has fishery, irrigation, and possible wetland.

Observed erosional/sedimentation/stream turbidity problems? Yes X, No____. Distance downstream (ft)? 0-500____; 500-1,000____; >1,000 X. Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Downstream has tailings 1/2 mile from mill.

SAMPLERS: Tuesday

FLOW: Estimated (E) or Measured (M) ?

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO₃)
Presence of evaporative salt deposits? (ESD)
Discolored or turbid seepage? (SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?
Presence of ferric hydroxide precipitates? (FEOX)
Presence of burned or stressed vegetation? (VEG)
pH \leq 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 acre below mill; 1 to 2 acres on top of tailings.

Wetlands present: Yes___, No X, Describe:_____

Carbonate rocks/soils: Yes X, No___, Describe: Limestone in dumps.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X;
100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or
greater___; Comments_____

Nearest residence: ___<1,000 ft; ___1,000 ft - 0.5 miles; X>0.5 miles.

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:

observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, West

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX	Dry	4,070	2,850	Yes	Low
WR-2	FEOX	Dry	8,000	5,600	Yes	Low
WR-3	FEOX	Dry	8,715	5,230	Yes	Low
SL-1	None	Dry	3,010	1,805	Yes	Low
TP-1	None	Dry	140,630	126,570	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X
Describe:_____

Population within 1 mile: 1-10____; 10-30____; 30-100____; 100-300____;
300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____;
Comments None

Evidence of recreational use on site: Yes X, No____, Describe: Litter;
campfire rings; off-road vehicle tracks

Accessibility (check each that apply): X Easily accessible - no fences,
gates, or warning signs;____ Moderately Accessible - barbed wire fences,
road gated, or signs posted;____ Difficult Access - chain-link fence,
road gated and locked, site guarded (does not include locked or manned
access points located more than 0.5 miles from the actual site).

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes____, No X, Comment_____
Wilderness Area - Yes____, No X, Comment_____
T&E Species Habitat - Yes____, No X, Comment_____
Bat Habitat - Yes____, No X, Comment_____

Primary Drainage____; Secondary Drainage____; No Information X:

Riparian Habitat Quality - High____, Medium____, Low____

Wetlands Frontage - High____, Medium____, Low____

Fisheries Habitat and Species Classification - ____

Sport Fishery Classification - ____

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No____, Number 2, types and locations:____
Formerly gated adits are broken open.

Hazardous structures: Yes____, No X, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes____, No X, Number____,
types and locations:_____

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 1, types and locations: TP-1 is undercut all the way down
drainage.

Fire and/or Explosion hazards: Yes____, No X, Explain:_____

Bibliography

MBMG, Well Log Database, July 14, 1994.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0,
Prepared by Montana Natural Resource Information System, December
1989.

MDSL/AMRB Files, Abandoned Mine Lands Portal Inventory Form for Prester
John, Prepared by Culwell and Larsen, August 3, 1983.

USGS, Topographic Maps, Judith Peak and Horsethief Coulee West, Montana,
7 1/2 minute Quadrangles, 1985.

LABORATORY ANALYTICAL DATA

**PRESTER JOHN
PA NO. 14-090**

Prester John PA# 14-090
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/15/94

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	Ag (mg/Kg)	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
14-090-SE1	0.6 UX	174 J	158	0.6 U	9.1	12.8	22.4	19800	0.16 J	649	27.5	23.2	6.3 UJ	68.5	NR
14-090-SE2	0.5 UX	614 J	478	0.5 U	2.7	8.8	21.1	6260	2.83 J	171	7.9	35.6 U	29.6 J	114	NR
14-090-TP1	1.0 JX	1430 J	598	0.4 U	5.0	14.9	10.4	10600	3.26 J	147	12.0	30.6 U	45.0 J	199	0.734
14-090-WR1	0.4 UX	781 J	481	0.4 U	3.1	5.4	14.5	9540	0.98 J	141	8.5	25.2 U	5.9 J	99.1	NR
BACKGROUND	0.5 UX	131 J	124	0.5 U	7.0	13.4	14.5	17600	0.08 J	467	18.2	19.3	5.3 UJ	65.6	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE U/1000t	NEUTRAL. POTENT. U/1000t	SULFUR ACID BASE POTENT. U/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE U/1000t	SULFUR ACID BASE POTENT. U/1000t
14-090-TP1	0.01	0.31	345	345	<0.01	<0.01	0.01	0.00	345
14-090-WR1	<0.01	0.00	362	362	<0.01	0.01	0.01	0.31	362

LEGEND

SE1 - Dry drainage above mine and mill.
SE2 - Dry drainage 700' bel w breached dam.
TP1 - Composite of subsamples TP1A through 1D.
WR1 - Composite of subsamples WR1, 2, 3A, and 3B.
BACKGROUND - From the Prester John Mine (14-090-SS1).

XRF ANALYSIS RESULTS

**PRESTER JOHN
PA NO. 14-090**

Mine Name: Prester John PA# 14-090
XRF Field Analyses
Results in PPM

XRF SAMPLE I.D.	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Ni	Cu	Zn	As	Sr
14-090-SE500		10192	181115	1137.87			9600.32			83.7468 *	122.028 *	1036.68	364.789
14-090-SL1		3241.85	5743.78	4445.69			110222	1619.28 *		147.391 *	146.436 *	97.7135 *	1647.42
14-090-TP1A		11966.5	149607	1623.41			13227				166.995 *	2965.11	1097.7
14-090-TP1B		15483.1	97336.4	1585.31			14421.3			70.7952 *	213.169 *	1049.83	526.679
14-090-TP1C		15756.7	111809	1252.31			13792			89.2903 *	193.577 *	1283.38	606.371
14-090-TP1D		10102.5	134798	764.673 *			10571			89.6683 *	236.919 *	1561.99	466.688
14-090-TP1-COMP		12229.9	117632	1191.74			13175.8				247.349 *	1851.19	718.402
14-090-TP1-COMP-DUP		12387.9	117067	1364.98			13395.5				230.05 *	1905.45	733.255
14-090-WR1		6474.28	125315	756.838			13235.7			67.4789 *	81.9267 *	432.942	167.783
14-090-WR1-COMP		11771.7	107636	666.197 *			14335.2				128.707 *	540.128	157.55
14-090-WR2		13789.2	67071	474.26 *			15073.8				179.979 *	684.41 *	147.313
14-090-WR3A		15538	120622	813.452 *			14781.1				120.02 *	905.946	297.433
14-090-WR3B		11030.2	115082	404.957 *			15812.9				86.6483 *	471.313	64.3166

XRF SAMPLE I.D.	Zr	Hg	Mo	Pb	Rb	Cd	Sn	Sb	Ba	Ag	U	Th
14-090-SE500	75.472				29.0227 *				427.698		12.0088 *	
14-090-SL1	1309.96								476.327		20.1768 *	
14-090-TP1A	128.682				42.012 *			190.613 *	874.982			
14-090-TP1B	121.252				49.7917 *			62.0584 *	383.001	105.706 *		
14-090-TP1C	119.842				52.7037 *			84.3143 *	499.781			
14-090-TP1D	79.639				27.4071 *			60.5439 *	501.241		16.5068 *	
14-090-TP1-COMP	126.96				57.2142 *				555.809		17.2269 *	
14-090-TP1-COMP-DUP	114.896				55.1259 *			75.3116 *	582.69		15.0776 *	
14-090-WR1	70.6797				22.6819 *				51.9433 *		16.2222 *	
14-090-WR1-COMP	122.211				63.8302 *				589.6		15.9566 *	
14-090-WR2	125.881				56.2457 *	116.982 *			1379.19			
14-090-WR3A	111.56			41.7363 *	62.4331 *				734.044			
14-090-WR3B	117.114			62.4331 *	77.7919 *				136.136			

* = Estimated Quantity

\$ = Unvalidated Data

**ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET**

**PRESTER JOHN
PA NO. 14-090**

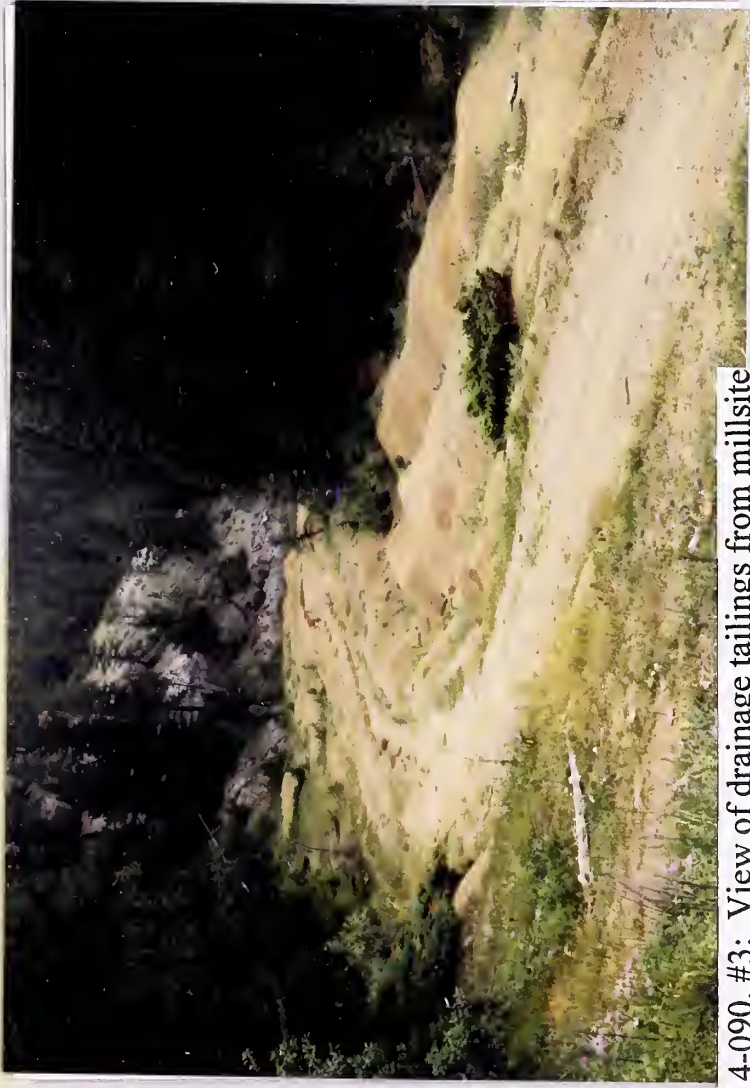
AIMSS SCORESHEET

SITE NAME:
PA NUMBER:

Prester John
14-090

LINE NO.		GROUNDWATER PATHWAY	
1		OBSERVED RELEASE	0
2		EXCEEDENCES	0
3A	GW - LIKELIHOOD	CONTAINMENT	20
3B	OF RELEASE	GW DEPTH	20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
6		WELLS - 1 MI. x 2.5	0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI	0
8		NEAREST WELL	0
9		TARGETS SCORE	LINES 6 + 7 + 8
10		GROUNDWATER SCORE	LINES 4 x 5 x 9
		SURFACE WATER PATHWAY	
11		OBSERVED RELEASE	300
12	SW - LIKELIHOOD	EXCEEDENCES	0
13A	OF RELEASE	CONTAINMENT	20
13B		DISTANCE TO SW	20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
16		DRINKING WATER POP'N	0
17		IMPACTED DRAINAGE	3
18		WETLANDS	10
19	SW - TARGETS	FISHERY	0
20		RECREATION	5
21		IRRIGATION/STOCK	2
22		T & E SPECIES HABITAT	0
23		TARGETS SCORE	SUM LINES 16 THRU 22
24		SURFACE WATER SCORE	LINES 14 x 15 x 23
		AIR PATHWAY	
25		OBSERVED RELEASE	0
26A	AIR - LIKELIHOOD	CONTAINMENT	5
26B	OF RELEASE	DISTANCE TO POPULATION	5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B
27		LIKELIHOOD SCORE	LINES 25 + 26C
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
29		POPULATION - 4 MILES	30
30		NEAREST RESIDENCE	0
31	AIR - TARGETS	WETLANDS	10
32		PARKS / WILDERNESS	0
33		T & E SPECIES HABITAT	0
34		TARGETS SCORE	SUM LINES 29 THRU 33
35		AIR PATHWAY SCORE	LINES 27 x 28 x 34
		DIRECT CONTACT PATHWAY	
36		OBSERVED EXPOSURE	50
37A	LIKELIHOOD OF	ACCESSIBILITY	20
37B	EXPOSURE	DISTANCE TO POPULATION	5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B
38		LIKELIHOOD SCORE	LINES 36 + 37C
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)
40	DIRECT CONTACT	POPULATION - 1 MILE	0
41	TARGETS	NEAREST RESIDENCE	0
42		RECREATIONAL USE	10
43		TARGETS SCORE	SUM LINES 40 THRU 42
44		DIRECT CONTACT SCORE	LINES 38 x 39 x 43
45	TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE		
	(LINES 10 + 24 + 35 + 44) / 100,000		3.05

LINE NO.			SITE NAME: Prester John
			PA NUMBER: 14-090
	<u>SITE SAFETY</u>		
1	THREAT	ACCESSIBILITY	20
2	HAZARDS	OPEN SHAFTS 100 EA.	100
3		OPEN ADITS 50 EA.	100
4		UNSTAB. HIWALLS / PITS 75 EA.	0
5		HAZ. STRUCTURES 40 EA.	0
6		EXPLOSIVES	0
7		HAZ. MATERIALS	0
8		HAZARDS SCORE SUM LINES 2 THRU 7	200
9	TARGETS	POPULATION - 1 MILE	0
10		NEAREST RESIDENCE	0
11		RECREATIONAL USE	10
12		TARGETS SCORE SUM LINES 9 THRU 11	10
13		SITE SAFETY SCORE (LINES 1 x 8 x 12) / 1,000	40.00



14-090, #3: View of drainage tailings from millsite



14-090, #4: WR-3 from below



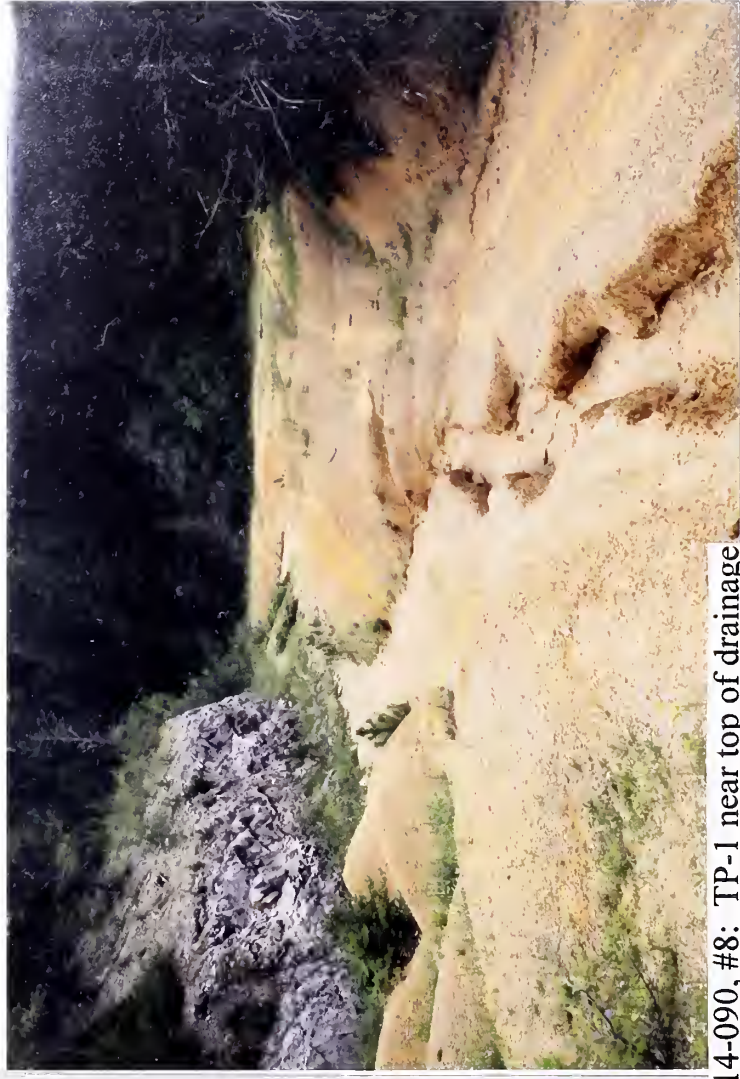
14-090, #5: Slag pile from drainage



14-090, #6: Adits with broken gates



14-090, #7: WR-2 from side



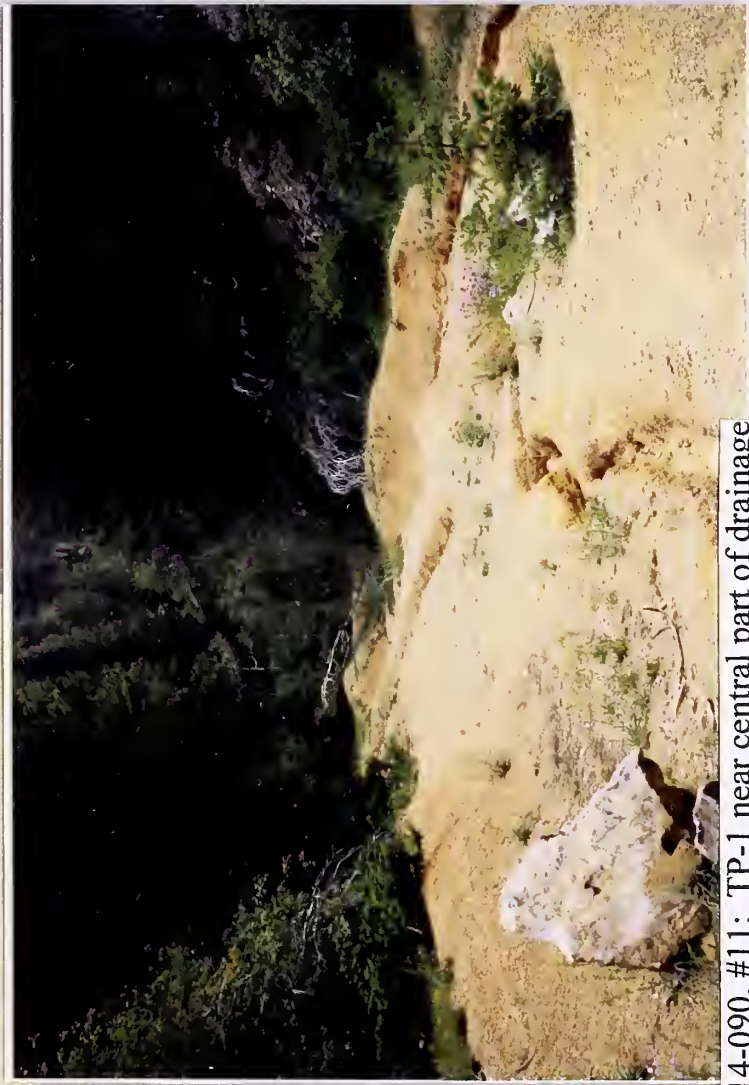
14-090, #8: TP-1 near top of drainage



14-090, #9: TP-1 near top of drainage



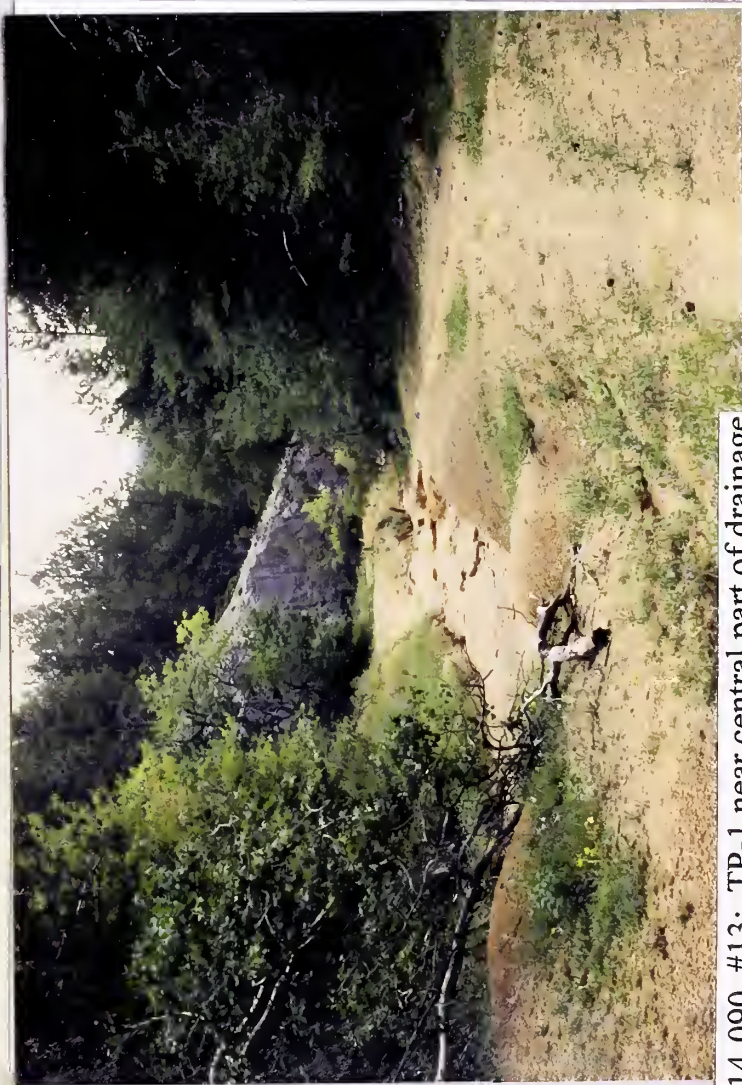
14-090, #10: TP-1 near top of drainage



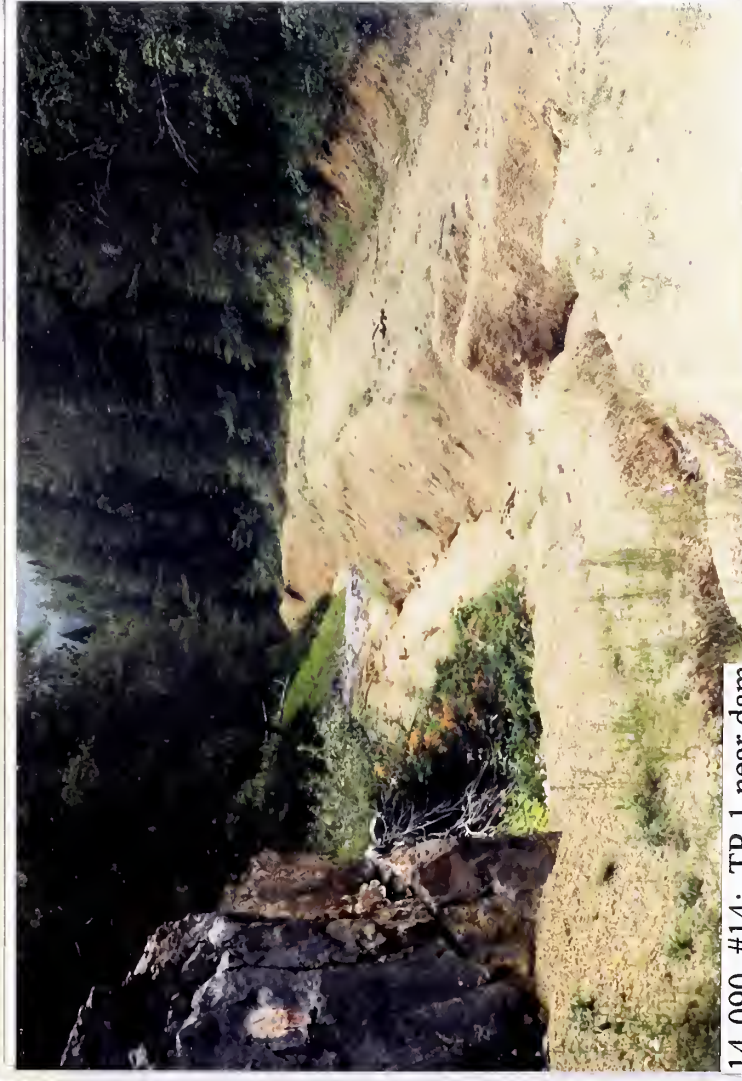
14-090, #11: TP-1 near central part of drainage



14-090, #12: TP-1 near central part of drainage



14-090, #13: TP-1 near central part of drainage



14-090, #14: TP-1 near dam



14-090, #15: End of tailings pile in stream bottom



14-090, #16: Tailings in wash below central part of drainage



14-090, #17: SE-2 sample location

